

Chapter 2

Understanding Organizational Vulnerabilities in Military Taskforces

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Abstract In this chapter, the relevance of a perspective on organizational vulnerability for improving safety in military taskforces is outlined. Research of the Netherlands Defence Academy has shown that military taskforces are systems with typical organizational vulnerabilities. More specifically, this research has shown that military taskforces had difficulties in developing and maintaining functional integration. This chapter analyzes whether the safety management system of the Netherlands Defence organization is useful for understanding such organizational vulnerabilities. After the conclusion that this focus on organizational vulnerabilities is lacking in this safety management system, existing theories on safety in organizations are analyzed. Based on a combination of insights from these theories, a theoretical avenue for understanding such vulnerabilities is proposed.

Keywords Organizational vulnerability • Functional integration • Safety management • Organizational design • Normal work

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2.1 Introduction

Approached as a problem of organizing, safety can be related to the issue of organizational vulnerability, which signifies “a reduced capability to maintain functional integration”.¹ Maintaining functional integration refers here to the issue of how organizations manage to survive as coherent systems, and this approach understands safety problems such as accidents and incidents as particular manifestations of organizational vulnerability. By defining organizations as “social systems that conduct experiments with their survival”, Achterbergh and Vriens place the issue of survival at the core of organization science.² Using this perspective, the organizational background of safety issues can be studied by taking into account the challenges to functional integration in a specific organization in a specific context. Organizational theories on safety specify a way to understand organizational vulnerability. Furthermore, debates between rival organizational theories on safety provide an interesting outlook on what is at stake when trying to conceptualize the dynamics of maintaining functional integration. Since many safety problems occur in organizational contexts, a focus on the organizational contributions to accidents and incidents is increasingly considered an important trend in safety science.³

Understanding organizational vulnerability is of the greatest relevance to the military organization because maintaining functional integration can be seen as a precondition to the ability of being effective in the first place. This seems particularly relevant as military task forces are operating in what Kramer calls dynamic complex environments in which operators are confronted with opponents that actively aim to undermine the operations of the task force.⁴ As to the Dutch military organization, research within the Netherlands Defence Academy has shown that the expeditionary taskforces that the Netherlands Armed Forces have been deploying the last decades could be considered *vulnerable systems*. Being taskforces, they are a temporary system of units that did not exist as an integrated system before a particular mission.⁵ Such a taskforce can be seen as a network of interconnecting units that are in contact with a dynamic environment at multiple

¹ Bijker 2006, p. 56.

² Achterbergh and Vriens 2010, p. 1; see Weick 1979 for another theorists that focuses on survival as a key issue.

³ Dekker 2014.

⁴ Kramer 2007.

⁵ Snook 2000.

positions at the same time. Particularly in Western Europe, military organizations design expeditionary taskforces by mixing and matching existing units for the purposes of a specific mission.⁶ The resulting collection of units has to be calibrated and re-calibrated extensively in order to develop an integrated taskforce that can deal with the specific demands of a complex operational environment.⁷ Research has shown examples of cases in which operators within expeditionary military taskforces were continuously self-designing in order to establish some form of functional integration.⁸ In particular, a case study of Task Force Uruzgan has shown that such efforts were seriously hindered by factors at the organizational level that could be associated with safety incidents.⁹ The combination of challenging environments and—more or less—improvised organizational constructions are significant pre-conditions for organizational vulnerability in military taskforces. Subsequently, it is important to understand organizational influences and instruments, such as safety management, that can be employed to improve the ability to develop functional integration and reduce organizational vulnerability.

The goal of this chapter is therefore to show the relevance of an organizational vulnerability perspective for understanding safety within military task forces by outlining a particular approach to understanding and studying vulnerability of military taskforces. The next section starts by discussing how the topic of safety management is dealt with within the Dutch military and how it relates to the theme of organizational vulnerability. This discussion reveals a particular dilemma for an organization that is oriented on safety in dynamic environments. The subsequent section aims to outline frequently used organizational theories on safety and reconstructs the academic debate between them. After that, the approach that we developed to study safety from an organizational vulnerability perspective within military taskforces will be discussed. This approach has been developed at the Netherlands Defence Academy on the basis of existing theory on organizational safety in relation to the specific characteristics of expeditionary military taskforces.¹⁰ The chapter will end by discussing why a relation between the topics of safety and organizational vulnerability is of more general relevance for organizations that operate in dynamic environments. All in all, this chapter not only contributes to the development of an understanding of the vulnerability of expeditionary military taskforces or network organizations more in general, but also to existing theoretical discussions on vulnerability in organizations.

⁶ De Waard and Kramer 2008; De Waard 2010.

⁷ Kramer 2007.

⁸ Kramer et al. 2012; Moorkamp et al. in press; Moorkamp and Kramer 2014.

⁹ Moorkamp and Kramer 2014.

¹⁰ Kramer 2007; Kramer et al. 2010, 2012, Moorkamp et al. 2014, in press.

2.2 Safety Management in the Dutch Military

Partly in response to demands made by the Dutch Safety Board,¹¹ a safety management system was implemented within the Netherlands Ministry of Defence.¹² The so-called *Veiligheidsmanagement Systeem Defensie* (VMSDef) complies with *International Organization for Standardization* (ISO) 9001, 14001 and *Occupational Health and Safety Management Systems* (OHSAS) 18001 norms. In safety science, safety management systems are criticized because they are considered to contribute to bureaucratization. They are criticized for focusing on how bureaucracy can work better and the assumption that safety will be the result of following procedures and rules.¹³ If that is the case, the question is how the Dutch military deals with vulnerability against the background of a dynamically complex security environment on the one hand, and the demands of a typical safety management system on the other.

One of the most salient aspects of VMSDef is the precondition that it is not considered applicable for safety issues that involve the presence of hostile opponents. The VMSDef guideline states: “it involves all health and safety issues within the Defence organization that do not involve any dangers from hostile opponents”.¹⁴ This suggests that safety is not generally considered as a precondition for effectiveness, but in some conditions actually as an obstacle to effectiveness, that is, the very conditions the military is supposed to be effective. That means that VMSDef has incorporated a clause that formalizes under what conditions it can be put aside. “The minister of Defence and the Chief of Staff may deviate from existing safety rules and procedures under operational circumstances (...) and apply Operational Risk Management in order to identify and register risks”. As such, Operational Risk Management (ORM) has a prominent place when it comes to developing safety under expeditionary operational circumstances. According to VMSDef: “Operational risk management is a systematic method, which is part of regular planning and executive processes, to make decisions on ways to control and minimize (unknown) risks during operations”.¹⁵ So it appears that under certain dynamic conditions VMSDef can be put aside in favour of a system that is better suited under those conditions.

The question is how this dynamic between VMSDef and ORM works out in task-forces and how this ORM procedure helps to understand vulnerability during operations in dynamic contexts. In a recent case study that was conducted within 107th Aerial Systems battery, a unit that operated Unmanned Aerial Vehicles (UAV's) within Task Force Uruzgan (TFU) it was learned that ORM was used to justify specific kinds of “safety rule-breaking”.¹⁶ On particular occasions, the commanding officer of TFU demanded that the UAV was deployed in conditions in which it was

¹¹ Onderzoeksraad Voor Veiligheid 2009.

¹² VMSDef; Ministry of Defence 2010.

¹³ Dekker 2014, p. 349; Bieder and Bourrier 2013; Hale 2003; Moorkamp et al. 2014.

¹⁴ Our translation; Ministry of Defence 2010, p. 1-1 (our translation).

¹⁵ Ministry of Defence 2010, p. vii (our translation).

¹⁶ Moorkamp and Kramer 2014.

forced beyond its known technological limitations. The UAV was, for example, deployed in a thunderstorm, in “icing-conditions” and in high temperatures in which it was feared that it would lack sufficient aerodynamic lift.¹⁷ The commanding officer of TFU justified this by claiming that deploying the UAV was crucial for establishing “overview” when for example infantry platoons were confronted with a shooting. So indeed, safety rules for the deployment of the UAV were put aside in the interest of safety of infantry soldiers. In such occasions, a particular interpretation of ORM was employed to move responsibility for the UAV and liability for potential damages operations from the UAV unit to the Task Force commander by means of a written and signed document. Employed in this way, the ORM procedure provides formal protection for operators for deployment against their better judgment. It provides the formal justification—it needs to be signed by a commanding officer that has been allowed the formal right to do so—to put aside rules that are related to the safe deployment of assets. As such, ORM is a tool that is used in the interest of averting accountability from an operator that is responsible for the safe operating of a technical asset to a superior commander who considers it necessary to deploy this asset in light of operational necessity, even though this might challenge—for example—its technical limitations. This shows that ORM, interpreted and applied in a particular way, can function as a “get-out-of-the-safety-jail-for-free” card, because operational necessity is always something that is to be interpreted by a higher commander.

There are two issues here that are important to understand the relevance of the perspective of organizational vulnerability. In the first place, the example above shows that the way one understands the nature of a socio-technical system determines how one tries to establish safety. If an organization is considered a machine in which every small part needs to operate in a precisely specified way, then indeed the reliable and safe functioning of this machine necessitates a dense web of rules that guides how specific parts should operate.¹⁸ As straightforward as this sounds to many people, this assumption quickly becomes problematic in dynamic environments. This is evident in the example above in the issue that the safety of one part (UAV) becomes opposed to the safety of another (a unit of infantry soldiers). The curious fact the VMSDef is not supposed to work in dynamic environments suddenly seems more straightforward.

Secondly, and related to the first argument, it is questionable whether the interpretation of ORM employed in the case helps military taskforces to understand challenges to functional integration. Although the phrasing suggests that ORM is a systematic method to minimize and control operational risks, VMSDef appears to lack an underlying theory and associated pragmatic tools that would enable the assessment of organizational vulnerability. One of the main examples that emerges in Moorkamp and Kramer’s case study is that the Dutch UAVs experienced near misses with Dutch Apache helicopters because the UAV unit lacked integration into Task Force Uruzgan.¹⁹ The point here is that in this way, ORM does not help oper-

¹⁷ Moorkamp and Kramer 2011.

¹⁸ Morgan 1997.

¹⁹ Moorkamp and Kramer 2014; Moorkamp et al. 2014.

ators to develop or maintain functional integration, nor to understand threats to functional integration other than those resulting from breaking unequivocal rules.

The above-mentioned example and the research findings highlighted in the introduction showed that operators throughout TFU were concerned with issues of functional integration, which resulted in organizational vulnerability. To come up with a perspective that is sensitive to such issues, the next section will aim to relate frequently used theories on organizational safety to the perspective of organizational vulnerability.

2.3 Vulnerability and Organizing for Safety

In the previous section, it was claimed that the way one aims to organize for safety depends on how one understands the character of socio-technical systems.²⁰ Understanding and studying organizational vulnerability of military task forces therefore calls for explicating different paradigms that lie behind different frequently used organizational safety theories. Therefore, firstly, two different paradigms in organizational safety theory are discussed. Secondly, based on these paradigms a choice is made for frequently used organizational safety theories that enable understanding the issue of organizational vulnerability within organizations and military task forces in particular.

In connection to safety, Dekker distinguishes between two “models” that guide the way organizations think about making progress with safety.²¹ The first model (*model 1*) perceives organizations as systems that are active in stable, or at least predictable environments. Following this assumption, the behaviour of organizations can be programmed by rules. Safety is seen as the result from people following procedures. Safety management is in this perspective “removing deviations” in order to improve predictability.²² The last 20 years, safety scientists have become disenchanted with this model.²³ Rasmussen notes that this “classic command and control model” is inadequate in dynamic situations. Dekker calls it “(...) naive at best, and always misleading”.²⁴

This disenchantment has given rise to the development of a second model. According to the second model (*model 2*): “safety results from people being skillful at judging when and how (and when not) to adapt procedures to local circumstances”.²⁵ Moorkamp et al. stress that according to this perspective organizations should be able to *cope with* uncertainty, rather than *remove* uncertainty, which is central in the first

²⁰ Zinck Pedersen 2013, p. 216.

²¹ Dekker 2005, pp. 133–139.

²² Moorkamp et al. 2014.

²³ Rasmussen 1997, p. 185.

²⁴ Dekker 2005, p. 137.

²⁵ Dekker 2005, p. 139.

model.²⁶ Defined in this way, safety is a *control-problem*—the problem of controlling an organization’s central processes—indeed to maintain the organized coherence of an organizational system.²⁷ In the second model, procedures are seen as “resources for action”, which cannot specify all circumstances in which they can be applied.²⁸ Nor can procedures dictate their own application. In fact, according to the second model, managing safety according to the first model can actually be counterproductive²⁹ and can encourage defensive behaviour in operators.³⁰

It seems obvious that the second model fits the kind of environments in which military taskforces are deployed. As was sketched in the introduction, military taskforces operate in an environment with uncertainties they need to be able to cope with, rather than that they are able to remove uncertainty. That is, they are not able to shield an organization from environmental uncertainty. As such they are not able to create the conditions in which the assumptions of a stable environment apply, which was typical of the first model. In this chapter we, therefore, focus on theories that share *model 2* assumptions. Being concerned with the implications of operating in an environment with uncertainties, these theories all rely on a systems theoretical basis. However, they differ in the organizational characteristics and dynamics they focus on and the way they conceptualize these. The three theories that are discussed below are Normal Accidents Theory (NAT), High Reliability Theory (HRT), and Resilience Engineering (RE). The first two were developed within organization science and were initially hardly picked up in safety science. RE is a relatively recent development that can be understood as a response to Rasmussen’s demand for modelling dynamic systems.

These theories and the academic debates between them will be discussed. One way to put the different organizational theories about safety into perspective is by relating them to the classic polemic in organization science between theories about *structure* and *process*. This polemic is essentially about a difference in studying organizations as solid entities and studying how these entities came into being in the first place,³¹ and is related to the broader discussion in social science between structure and agency.³² Weick refers to this dichotomy as a difference in studying the noun “organization” and the verb “organizing”.³³ While structure refers to fixed—noun-like—characteristics of organizations, such as their structural design, process refers to the way activities—verbs—within systems are organized. From a safety perspective, this means a difference in focusing on organizational vulnerabilities that are related to the structural characteristics of systems versus a focus on vulnerabilities that are related to the way people act and coordinate to deal with disruptions.

²⁶ Moorkamp et al. 2014, p. 3.

²⁷ Leveson 2004, pp. 249–250.

²⁸ Dekker 2005, p. 139.

²⁹ Gilpin and Murphy 2008, p. 5.

³⁰ Fucks and Dien 2013.

³¹ Tsoukas 2005, pp. 379–380.

³² Kramer 2007.

³³ Weick 1979.

The next section will focus on developing a perspective in which elements of both a *structure* and *process* perspective are combined, which are both considered important in studying vulnerabilities in complex organizations.³⁴ In fact, Becker considers the issue of how to combine structure and agency to be essential for any social theory.³⁵

2.3.1 *Vulnerability and Structure*

NAT is the organizational theory that mainly focuses on vulnerability from a *structure perspective*. Charles Perrow developed NAT in response to the high profile incidents in the Three Miles Island (TMI) nuclear reactor.³⁶ While previously safety science focused on either technical or human error,³⁷ NAT first identified *organization* as a decisive factor in safety. The idea is that in systems with certain organizational characteristics, accidents can be *normal*. That is, they can be considered as the predictable outcome of the organization's normal functioning. Basically, NAT is a theory about cascading failures. In systems with complex and partly unpredictable patterns of interacting parts (complex interaction), and in which these interactions are critically interdependent (tight coupling), small deviations, disruptions, technical glitches or mundane human errors can combine in a way that leads to a cascade of failures. Eventually such a cascade can lead to system accidents: the collapse of functional integration of a system. This was a disturbing argument at the time; systems with no significant technical malfunctions and in which no catastrophic blunders are made by operators still can collapse as a result of organization.

The essence of NAT's argument is that some organizations are more vulnerable to cascading failures than others. According to NAT, in dynamic environments disturbances are best absorbed locally—which demands decentralization—while in organizations in which crucial functions are tightly coupled, sufficient overview to make crucial decisions is only available at a centralized position. That is, systems that are characterized by complex interactions and tight couplings are confronted with conflicting demands: they should be centralized and decentralized at the same time. At the central positions there is too little understanding of local disturbances, which makes centralization an unfit control strategy. At the same time, because of a lack of overview of critical interdependencies between parts of a system, local disturbances with a potential to cause system-wide interference cannot be adequately controlled at the decentralized positions. Systems that are characterized by complex interactions and tight couplings are, according to NAT, therefore fundamentally vulnerable to cascading failures.

Focusing on interactions and couplings, like NAT does, is a way to analyze systems by taking stable, macro-level characteristics into account. Although Perrow emphasizes that NAT was an early formulation in which the systems theoretical

³⁴ Kramer 2007, pp. 87–88; also Hernes 2014, p. 67.

³⁵ Becker 2005.

³⁶ Perrow 1999.

³⁷ Reason 1997.

basis was not fully worked out,³⁸ it can, however, be related to a socio-technical theoretical perspective on organizations.³⁹ If systems possess a more or less solid hierarchical form (a layering of subsystems within systems⁴⁰) and if this solid form is meant to interact in a specific way in order to handle certain tasks, this basic *production structure* can be called: “the grouping and coupling of operational activities in relation to order flows”.⁴¹ This particular interpretation of NAT leads to a view on safety in which the *production structure* is the object that is to be controlled by a *control structure*. The more complex the web of macro structural interdependencies and the more crucial the interrelations that make up a production structure is, the more a system is bound by rules, which subsequently limits its ability to handle disruption. Normal accidents are in this view situations in which the amount of potential mistakes produced by a production structure in relation to environmental disruptions exceeds the system’s capabilities for control.⁴²

2.3.2 Vulnerability and Process

At the end of the 1980s, HRT was initially formulated as a response to NAT. If one agrees that systems that are characterized by complex interactions and tight couplings are fundamentally uncontrollable, why aren’t there more accidents? The idea that led to the development of HRT was that there are *sources of reliability* available in organizations that prevent a cascade into failure.⁴³ Organizations that maintain a high level of reliability, despite working with hazardous technology or in complex environments, are called High Reliability Organizations (HROs). The study of HROs was focused on finding these sources of reliability. The sources of reliability HRT was looking for were located in the abilities of operators to absorb disturbances, even within tightly coupled and centralized structures. This is for example illustrated by the study of flight decks by Weick and Roberts.⁴⁴ Besides aircraft carriers, the kinds of organizations studied by HRT theorists are submarines, air traffic control systems and nuclear facilities.⁴⁵

Given this emphasis on organic organizing processes, HRT has sought theoretical underpinning in the organizational theory developed by Weick.⁴⁶ The attention for the dynamic process properties of systems is evident in Weick’s claim that “streams,

³⁸ Perrow 2004.

³⁹ Kramer 2007, p. 122.

⁴⁰ Simon 1962.

⁴¹ De Sitter 2000, p. 97 (our translation).

⁴² De Sitter 2000; De Sitter et al. 1997; Moorkamp et al. 2015.

⁴³ La Porte and Rochlin 1994, p. 222.

⁴⁴ Weick and Roberts 1993.

⁴⁵ Bierly and Spender 1995; La Porte 1988; Perin 2006.

⁴⁶ Weick et al. 1999.

flows, and changes are the essence of what managers manage”.⁴⁷ In the perspective of Weick, “organizing” is an activity that “serves to narrow the range of possibilities, to reduce the number of ‘might occurs’”. “In this perspective, the activities of organizing are directed toward the establishment of a ‘workable level of certainty’”.⁴⁸ This fits with a particular view on organizations, “the image of organizations that we prefer is one that argues that organizations keep falling apart and they require “chronic rebuilding”.⁴⁹ This view on organizations opposes the view of organizations as solid entities that every now and then are confronted with a threat. Also, Weick portrays an organization against the background of an uncertain, ambiguous, changeable or dynamically complex environment, although he specifically emphasizes that this environment is—partly—constructed by the organizing activities of a system.⁵⁰ The emphasis on the need for chronic rebuilding indicates that functional integration has to be continuously re-established. Therefore, notwithstanding the search for sources of reliability that keep systems with manifest design flaws safe, HRT in a sense portrays systems as even more vulnerable than NAT. Organizations are in this view fragile constructions held together by transient organizing processes. This has consequences for the view on safety: in an organization that needs constant rebuilding, safety cannot be established by enforcing pre-programmed behaviour, which follows from the definition of safety as a “dynamic non-event”, “what produces the stable outcome is constant change rather than continuous repetition”.⁵¹

Against the background of the organizing problem explained above, Weick considers sensemaking a crucial process in organizations. Sensemaking is about “the ongoing retrospective development of plausible images that rationalize what people are doing”.⁵² Sensemaking is certainly not straightforwardly portrayed as a “solution” to the problem of dealing with a dynamically complex environment. After all, if environmental signals are “really” uncertain, enactments cannot solely rely on existing knowledge. In dynamically complex environments sensemaking is equally about “sensediscrediting”, that is, the challenging of existing ideas.⁵³ “Only with ambivalent use of previous knowledge are systems able to both benefit from lessons learned and to update either their actions or meanings in ways that adapt to changes in the system and its context”.⁵⁴ Sensemaking is, in other words, the organization’s confrontation with itself,⁵⁵ in which “doubt” is an essential ingredient. An important implication of this is that operators in dynamically complex contexts are in a

⁴⁷ Weick 1979, p. 42.

⁴⁸ Weick 1979, p. 3.

⁴⁹ Weick 1979, p. 44.

⁵⁰ Kramer 2007.

⁵¹ Reason 1997, p. 37.

⁵² Weick et al. 2009, p. 129.

⁵³ Weick 1979.

⁵⁴ Weick 2009 p. 139.

⁵⁵ Hutter and Power 2005, p. 25.

sense “beyond rules”.⁵⁶ Operators might need to act, and to create, brake, bend and blend rules in order to keep a system from falling apart, which indicates that they occupy a meta-position in relation to the rules that govern their work.⁵⁷

Since the early 1990s the academic debate on safety within organizations has been dominated by the polemic between NAT and HRT.⁵⁸ NAT criticized HRT for being overly optimistic,⁵⁹ for underestimating the influence of design on organic organizing processes, or for selecting case studies on the dependent variable (mainly relatively successful/highly reliable organizations were studied). HRT on its part criticized NAT for entertaining a too static view of organizations, and for confusing technical and social systems.⁶⁰ HRT argues that tight coupling and complex interactions are not static properties of systems.⁶¹ Activities that appear loosely coupled can suddenly become tightly coupled as a result of certain unexpected developments. HRT furthermore claims that centralization and decentralization should not be seen as static opposites.⁶² There are still publications emerging which try to develop a resolution to this debate,⁶³ or claim to have found a special case that cannot be explained by both theories and which requires a new form of explanation.⁶⁴ It is probably fair to say that most theorists would argue that some way of combining structure and process perspectives is necessary to understand organizational vulnerability. As such, NAT and HRT perhaps function as ideal-typical reference points in an academic debate on the interplay between structure and process, while few would adhere to one of the extremes while totally dismissing the other.

2.3.3 *Vulnerability and the Interplay Between Structure and Process*

The previous emphasized that NAT predominantly focuses on *structure* (i.e., the basic structural design of systems) while HRT focuses on *process* in organizations (i.e., the way people interact within an organization to coordinate their activities). As it emphasizes both structure and process, RE appears at face value as an approach that occupies a position between NAT and HRT. RE is not a theory that originates from organization science, but has been developed in response to Rasmussen’s disenchantment explained above.

RE has developed a complicated account of structure in systems. Inspired by complexity science, Dekker has worked out a perspective on organizations in

⁵⁶ Weick 1979; Kramer 2007.

⁵⁷ Kramer and Van Bezooijen, in press.

⁵⁸ Sagan 1993; Rijkman 1997.

⁵⁹ Sagan 1993.

⁶⁰ La Porte and Rochlin 1994.

⁶¹ Weick 2001.

⁶² La Porte and Rochlin 1994, p. 224.

⁶³ Shrivastava et al. 2009.

⁶⁴ Roe and Schulman 2008.

which the idea of *organized complexity* is central. “It is complex because there are a large number of components, and, as a result, a dense throng of mini-programs running and interacting, cross influencing each other”. “But what it produces is not disorganized. Rather it is organized (...) as an amazing emergent product of the complex interactions between a multitude of simpler entities”.⁶⁵ Although systems are organized and structured, they are according to this view not organized and structured as a result of design. The ant colony is the image of organization that is central here.⁶⁶ This image focuses on the complicated organized behaviour that is displayed by ant colonies, while no single ant has designed the colony, or understands it in its entire complexity. The organized behaviour of the colony is a macro-level phenomenon that emerges from the behaviour of interacting ants. The emphasis on emergence is meant to dismiss the idea of hierarchical layering or organization design. Structure is *organized complexity*, which refers to a complex web of interrelations between activities and is not designed.

Apart from a focus on structure, RE emphasizes process by emphasizing the role of operators in handling complexity. They are not considered as straightforward rule followers but as intelligent and mindful agents. An important issue for RE is that traditional *model 1* accounts lead to a biased understanding of the role of “human error” in accident causation.⁶⁷ The critique is that the context of errors is not taken into account.⁶⁸ RE has developed a view on “error” which emphasizes that they may be deeply ingrained practices that were developed to avoid “systems failures”.⁶⁹ What looking back on an accident appears as a straightforward “human error” may have been a desperate attempt by operators to maintain functional integration. This leads to a different view on rules: “There is a deeper, more complex interplay whereby practice sometimes precedes and defines the rules rather than being defined by them”.⁷⁰ Furthermore: “High reliability organizations (...) distinguish themselves by their constant investment in trying to monitor and understand the gap between procedures and practice. The common reflex is not to try to close the gap, but to understand why it exists”.⁷¹ Within safety science this has become known as a “normal work” perspective: it is the “normal work” of operators to handle complexity and studying “normal work” is seen as an important way to develop an understanding of safety dynamics.⁷² Structure and process are interrelated in RE because the activities of operators in dealing with complexity can have counterproductive effects on a macro-level in the system of organized complexity.

⁶⁵ Dekker 2011, p. 157.

⁶⁶ Dekker 2011, p. 157.

⁶⁷ Woods et al. 2010, p. 4.

⁶⁸ Reiman and Rollenhagen 2011, p. 1272.

⁶⁹ Dekker 2005.

⁷⁰ Dekker 2005, p. 133.

⁷¹ Dekker 2005 p. 141.

⁷² Bourrier 2002.

The above makes clear that structure and process are very much intertwined in RE. Actually, what is called *organized complexity* seems to focus attention on the structured aspects of what was called process above: networks of acting and interacting operators, involved with the everyday business of maintaining functional integration. A focus on organizational design is not taken into account, and therefore it is apparently considered irrelevant. The attention is on *organized complexity* and Dekker considers complex systems both resilient and vulnerable by virtue of their complexity, which he deems a paradox. “Because they consist of complex webs of relationships, and because a lot of control is distributed rather than centralized, complex systems can adapt to a changing world”. However, “Complexity opens up a way for a particular kind of brittleness. Their openness means unpredictable behaviour”.⁷³ According to RE not just “organized complexity”, but also accidents are the result of emergence.⁷⁴ Quite similar to NAT, accidents are according to RE the result of a cascade. “Failures, when they do occur, can cascade through these systems in ways that may confound the people managing them, making it difficult to stop a progression of failure”.⁷⁵ The confusing aspect is that complexity science is about how higher-level *order* emerges out of local interactions, whereas system accidents are according to RE about how global *disorder* results out of local interactions.

Although RE emphasizes in a certain way both structure and process, its position is not really between NAT and HRT. For RE, *complexity* is a general condition of all organizations in all situations and an explanation for both resilience and accidents. Opposed to that, both NAT and HRT relate vulnerability to systems that are characterized by complex interactions and tight couplings.⁷⁶ By emphasizing a particular of idea of organized complexity that dismisses attention for design as a relic from mechanistic thinking, RE is insensitive to the way design shapes local interactions and to the way different designs may have differing influences on the ability of operators to deal with complexity.⁷⁷

2.4 Studying Vulnerability in Military Taskforces

The organizational theories on safety summarize generic ideas about vulnerability in organizations. Despite differences in emphasis, all three basically adhere to a *model 2* perspective on organizations and rules. In this section we want to develop a conceptualization of vulnerability in organizations that uses ingredients from all three approaches, but differs in the way the interplay between *structure* and

⁷³ Dekker 2011 p. 153.

⁷⁴ Dekker et al. 2011, p. 942; Woods et al. 2010, p. 38.

⁷⁵ Dekker 2011, p. 128.

⁷⁶ Zinck Pedersen 2013.

⁷⁷ Moorkamp et al. 2014.

process is conceptualized. The basic idea is that in large socio-technical systems hierarchical layering of subsystems within systems—and therefore design—based on a particular “grouping and coupling” is a necessary and functional characteristic.⁷⁸ At the same time, any design is inevitably challenged and potentially outdated against the background of a confrontation with a dynamic complex environment that demands change and evolution. This outdated character of design is visible in process: operators that aim to maintain functional integration are essentially involved with this issue. For this reason, it is claimed here that systems need to organize their ability to continuously reflect on their organization: they need to “organize doubt” directed at their own organization.⁷⁹

The approach we want to sketch takes up the idea of *normal work* from RE: the normal work of operators consists of dealing with dynamic complexity. Studying normal work offers therefore a particular lens on organizational vulnerability. However, because of the theoretical issues with the idea of *organized complexity* that were discussed in the previous paragraph, we want to propose a different conceptualization of normal work. This conceptualization is based upon a different idea about the interplay between structure and process, which is based upon a particular way of combining NAT and HRT. The idea of “the organizational skeleton”, developed by Weick, is considered here as a particular useful way of combining NAT and HRT.⁸⁰ Weick uses a definition by Bate, Kahn and Pye who claim that: “design is a bare bones framework on which a more organic, emergent, social structure develops as people interact, argue, fall out, come together, and otherwise manage their day to day situation”.⁸¹ In this definition “the skeleton” refers to what was previously called a *production structure* (a division of labour), which has been related to NAT, while “the organic, emergent, social structure” refers to *process*, which was the object of study of HRT. The idea of the skeleton is applied by Weick to point out the value of underspecification in organization design. Weick’s argument is that underspecification creates loosely coupled systems. Loose coupling is conducive of the development of an “organic, emergent, social structure”, which is crucial because of adaptability. The idea of the *organizational skeleton* is different from the idea of *organized complexity* because of the role of organizational structure (the bones). On the one hand, organizational structure can be important for coherence in larger organizations. Division of labour and a resulting hierarchical nesting of subsystems within systems is according to Simon essential because it counters information overload.⁸² On the other hand, an organizational structure can reduce the flexibility of the skeleton. If a structure establishes “the grouping and coupling of operational activities in relation to order

⁷⁸ Simon 1962.

⁷⁹ Kramer 2007.

⁸⁰ Weick 2004.

⁸¹ Bate et al. 2000, p. 199.

⁸² Simon 1962.

flows”, critical specifications between subsystems will develop.⁸³ These critical specifications bind local emerging structures to specific rules, or to a need for a centralized command.

Given this focus on the *organizational skeleton*, *normal work* is not just about handling complexity, but about dealing with dynamic complexity in view of the possibilities and limitations that the skeleton allows. Normal work, in our view, needs therefore to be understood as being in its very essence about the interplay between structure and process, and as the very place in which organizational vulnerability manifests itself. Operators in dynamically complex environments are confronted with all kinds of disruptions. Indeed, the normal work of operators is to handle these disruptions. Studying normal work is informative because it provides insight into the everyday dealings within an organization that needs to deal with dynamic complexity. This handling of disruptions needs to be understood against the background of a *structure* that limits the degrees of freedom at the lower levels. If operators deal with a particular disruption, their options are limited by the flexibility that the organizational network allows. Furthermore, their particular perspective on their environment is influenced by the position they occupy in the organization.⁸⁴ Part of their creativity in handling disruptions is in finding solutions for operational problems in a way that does not break the functional integration of the skeleton. Ideally, the structural limitations that operators experience in handling dynamic complexity are used to reflect on the organizational structure of the organization (organizing doubt). In that case a relation is established between the struggles to deal with dynamic complexity and the nature of the organizational skeleton.

When this perspective on organizations is used it is obvious that they are considered inherently vulnerable. Their design is principally outdated against the background of a dynamically complex environment. In such environments, organizations are fundamentally unsettled. Functional integration needs to be established from moment to moment, and the resulting coherence is not a sort of system-wide symphonious harmony, but one that is good enough to survive to the next moment. In normal work, the conflict between on the one hand environmental disruptions and on the other hand the conflict with the existing structural design of an organization becomes visible. The solutions found by operators can potentially lead to vulnerability because they were unaware of certain dependencies between different processes, because they provoke a certain reaction from the environment and as such setting the stage for further environmental disruptions. Obviously, in order to understand the dynamics active in normal work, one needs to study more than just normal work. Insight in the organizational context of normal work is necessary, that is, insight in both the production structure and formal control structure, as well as the flow of the primary processes to which operators contribute, throughout the organization.

⁸³ De Sitter 2000, p. 97 (our translation).

⁸⁴ Kramer 2007.

2.5 Conclusion and Discussion

Studying normal work is according to the perspective in this chapter the royal road to understanding a particular kind of organizational vulnerability of a system. When this perspective is applied to military taskforces, specifically expeditionary taskforces that were deployed by the Netherlands Armed Forces, a couple of issues stand out. In the introduction, it was emphasized that expeditionary military taskforces are temporary constructions that are designed for a particular mission and that need to find a design that works in a particular environment. This is more than just the result of *underspecification*: the structure is *underdeveloped* because basic interactions within a system need to be organized. These taskforces are like a collection of bones that needs to find out what skeleton it needs to become and how to realize that.⁸⁵ Empirical studies into Dutch expeditionary taskforces consistently reveal that the internal structure needs to be (sometimes continuously) recalibrated in order to adapt to local conditions.⁸⁶ An implication of this can be that in some expeditionary taskforces operators essentially develop the organization or network design through normal work.⁸⁷ In trying to manage outside disruptions and internal hidden interactions, operators create structures that are meant to control (their own) future interactions.⁸⁸ In that case normal work almost equals designing.

If normal work is about dealing with dynamic complexity in view of the possibilities and limitations that the organizational skeleton allows, a particular vulnerability of typical expeditionary military taskforces deployed by the Netherlands Armed Forces becomes clear. Essentially, normal work proceeds against the background of a not fully worked out skeleton, and therefore with a limited view on structural constraints on normal work. In taskforces that are so large and complex that they escape the comprehension of those involved, this can lead to a threat of functional integration. If normal work contributes to creating structures this can lead to flawed skeletons. More specifically, this is the case if a structure mushrooms while it is unclear what the effects of local structuration efforts are on the integration of the whole. A structural design that mushrooms out of the control of those involved can lead to *tight coupling* between central processes with limited awareness of this at both the centralized and decentralized positions. Such an organization lacks the ability to reflect on its own design (organizing doubt). This

⁸⁵ This indicates a limitation of the modular design philosophy for designing military taskforces. This philosophy assumes an environment that is stable enough to be able to beforehand work out a basic design that can remain consistent, De Waard and Kramer 2010; Therefore, it is difficult to conceive of a design of a module that can remain consistent in the security contexts in which the Army is deployed. The modular design philosophy apparently lacks an idea of *organized doubt* that may be necessary to reflect on the design in the light of unpredicted dynamics.

⁸⁶ Kramer 2007; Kramer et al. 2012.

⁸⁷ Moorkamp et al. 2015.

⁸⁸ Moorkamp et al. 2015; Moorkamp and Kramer 2014.

particular vulnerability was indeed observed in an analysis of Task Force Uruzgan.⁸⁹ Basically, this situation sets the stage for normal accidents. This shows the importance of organizing the ability of a system to reflect on its own design (i.e., to organize doubt). It also shows the risks involved in portraying the ant colony as image of the ideal organization with supreme adaptability. One particular issue that makes the expeditionary taskforce vulnerable is that it resembles the ant colony, with ants that are unaware of the impact of their “normal work” on functional integration of the colony.

From this discussion, it is obvious that inherently vulnerable taskforces are in everyday reality polymorphously vulnerable systems. That is to say, from the perspective of maintaining functional integration, vulnerability can be witnessed at different organizational levels such the level of the local operational unit and the macro taskforce level. If a taskforce is seen as a network of interconnecting units that are in contact with a dynamic environment at multiple positions at the same time, different operators are trying to deal with the problems within their work domain on the basis of a limited understanding of critical interdependencies within this network. Furthermore, in developing the taskforces they are part of, operators may choose to solve local problems by inadvertently creating imbalances at the macro-level of the taskforces. The perspective developed in this chapter points to important limitations of safety management systems such as VMSDef that employ “model one” assumptions without consideration for organizational dynamics in complex security environments in which the defence organizations are deployed.

As a final remark, it can be stated that for two reasons the perspective outlined in this chapter is more generally relevant for organizations. Firstly, more and more organizations seem to employ a strategy of establishing temporary organizational forms in order to conduct operations in a challenging environment.⁹⁰ Some examples can be found in crisis management, project management literature and construction.⁹¹ Comparable vulnerabilities may be found in such organizations. Further research however, needs to address these possibilities for generalization in more detail. Secondly, understanding safety problems by means of a vulnerability perspective that combines process and structure might be of added value in taking a more integrated perspective in understanding and tackling safety issues. As such, this chapter not only contributes to the development of an understanding of military taskforces or to temporary organizations, but to existing discussions on safety in organizations in general.

⁸⁹ Moorkamp et al. 2015; Moorkamp and Kramer 2014.

⁹⁰ De Waard and Kramer 2008; Modig 2007.

⁹¹ Flyvbjerg et al. 2003.

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