An Externalizable Model of Tactical Mission Control for Knowledge Transfer

Dennis Andersson, Swedish Defence Research Agency, Linköping, Sweden

ABSTRACT

Organizations that deal with humanitarian assistance, disaster response and military activities are often exposed to dynamic environments where chaos rules. Under these circumstances, standard operating procedures may not be always be applicable, forcing the controllers to resort to opportunistic, or even scrambled, control. The lack of tactical or strategic control forces the teams to rely on experience from scenario-based training and prior missions. Acquiring, and retaining, such experience is thus essential to prepare for future events. Based on ideas from the knowledge management community, this article proposes an externalizable control model, supporting methods for retaining mission experience through internalization via hypermedia. Such a knowledge base of experience can be used to simplify knowledge sharing, an important matter since first-hand experience from rare and extreme events is, naturally, rare. The knowledge base synthesizes actual decision making processes, complete with context, history, cues, and interactions and is captured through a combination of heterogeneous multimedia recordings, sensor readings, and documents relating to the mission. The approach can complement regular training and apprenticeships, to help establish and maintain a pool of knowledge and increase tactical commanders’ recognition-primed decision-making capability.

Keywords: Externalizable Model, Knowledge, Mission, Strategic Control, Tactical Control

INTRODUCTION

In times of need, societies rely on authorities and civil services to resolve complex and potentially life-threatening situations. This holds true both for rather normal emergencies such as fires and accidents, but also for extraordinary events that are less common. While training and set routines are a great help for the more common scenarios, rare events that are not commonly trained are naturally harder to prepare and be vigilant for. The challenges do not even have to be globally rare, or unique, for them to become non-standard scenarios; it is enough that the responsible organizations lack the experience required to handle them (Jennex & Raman, 2009).

One solution for this problem has been proposed by implementing resilience through improvisation training (Chelariu, Johnston, & Young, 2002; Mendonça & Wallace, 2007; Weick & Sutcliffe, 2001). The ideas is based on the fact that first responders, and other civil services, are regularly forced to improvise, make rapid decisions, and act based on unreliable and incomplete information. Under certain condi-
tions, such as the life-threatening Mann-Gulch disaster, controllers sometimes force their own conception of a situation into another that they have themselves experienced before (Weick, 1993). This type of subconscious associating is referred to as recognition-primed decision making (RPDM) (Klein, 1993).

A direct implication of RPDM is that one of the most central components of organizational memory systems for these civil service organizations is the personnel, with their experiences. Since successful response to a crisis may rely on the use of knowledge from the past, decision makers’ experience level directly impact the teams’ performance, implying that these organizations have a need to acquire and retain experience (Jennex & Raman, 2009).

**Objective**

A central problem among tactical organizations today is that experience from rare and unforeseen tactical operations is hard to acquire, and therefore controllers lack the needed pool of prior scenarios to make well-grounded recognition-primed decisions in dynamic environments. This article aims to explore alternative approaches of acquiring said mission experience, make it more easily accessible, and thereby to support knowledge transfer.

**Contribution**

This article serves to propose a model of the tactical control process, for the explicit purpose of capturing mission experience and making it externally accessible in a format that may stimulate learning. The key principles of the model are (1) to represent tactical situations with adequate context and detail, (2) to stimulate learning through visual exploration, (3) to enable indexing for querying and retrieval, and (4) to support causality analysis.

The proposed model is anchored in existing theories and research on the concepts of dynamic control, experience, knowledge transfer, organizational memory systems, knowledge representation, situation representation, control, and team performance. Adequate understanding of these five components, as well as the problem itself, enables theorization of how to share mission experience with the help of modern methods and technology.

**BACKGROUND**

At the core of tactical operations are teams of controllers working towards the same goal, restricted by time and space, rules of engagement, etc. The concept includes a wide variety of different operations, e.g. crisis management, first response, military missions, cyber operations, financial operations, etc. A characteristic of this type of missions is that they are sensitive to context, therefore all functions must be adapted to match these specific contexts, even when the contextual differences are minor (Weick & Sutcliffe, 2001; Woods & Hollnagel, 2006). Controllers working under such diverse and dynamic circumstances are often forced to make decision based on partial or no understanding of the situation, forcing control away from tactical control mode to opportunistic, thereby limiting the performance ability (Hollnagel & Woods, 2005a).

Klein’s model of recognition-primed decision making (RPDM) describes how decisions are made using a naturalistic strategy, in dynamic and time-constrained situations (Klein, 1989). According to the RPDM model, decisions are based on subjective mapping of current situations to previously experienced ones, and implemented through improvisation and adaptation of earlier strategies. This strategy enables fast decisions, despite having to rely on inadequate and uncertain information as is often the case in opportunistic control mode. The cost of applying this strategy is an obvious risk for biases leading to irrational and erroneous decisions.

Scenario-based training and field experience are common methods of improving the controllers’ pool of knowledge, increasing their ability of recognizing scenarios and making better decisions under such difficult conditions. However, to enhance the controllers’ readiness to manage a diverse set of tactical scenarios, including scenarios that cannot be
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