Chapter 69
Operative Role Management in Information Systems

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ABSTRACT

Operative role management relates to the commanding officers' work of managing their resources dealing with emergency situations. It concerns assigning and delegating the right roles to the right resources at a specific moment. Role management is commonly understood as system role management, relating to access control and administrative role management. Operative role management is in turn the practical daily work of emergency organizations' personnel and relates to overall resource management. In-depth ethnographic research has been carried out, and the difference between operative and system role management has been distinguished in this chapter. The research concentrates both on the practical work processes of the emergency management staff and on the information systems and their functionalities. Through this two-folded approach, role management approach has been divided into three domains: administrative management domain, operative domain, and their common domain. The chapter focuses on describing the interdependencies between the role management approaches with examples from field studies and findings from literature.

INTRODUCTION AND BACKGROUND

Commonly, role management refers to an organization's capability to manage the roles in which each employee performs as part of his or her job functions. In technological terms, role management relates to managing access control/authorization and specifying the resources the users are allowed to access in an application or computer system (Aedo, Diaz & Sanz, 2006; Al-Kahtani & Sandhu, 2002; Ferraiolo, Kuhn & Chandramouli, 2007). RBAC (Role-Based Access Control) regulates the access to resources and computer system objects based on the roles defined in an organization (Sanz, Aedo, Diaz & de Castro, 2006; Ferraiolo, Kuhn & Chandramouli, 2007). The key RBAC hypothesis is that roles and related responsibilities are much more persistent than users (Sanz et al.,

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2006; Aedo et al., 2006). After the responsibilities of an organization are defined, they rarely change. Usually, what changes is the user or users that work with a specific responsibility in a specific situation. Much of the previous research in this field is based on RBAC, its mechanisms and extensions (Sanz, Gómez Bello, Díaz, Sainz & Aedo, 2007; Haibin & MengChu, 2006; Aedo & al., 2006; Tahir, 2007), such as context-aware dynamic access control (Kim et al., 2005; Zhang & Parashar, 2004) or attribute-based user-role assignment (Al-Kahtani & Sandhu, 2002).

In multi-authority emergency situations where collaboration between authorities emerges, it is often necessary to share information within or between organizations. The organizations have implemented various information and communication systems to support the activities in the command and control rooms as well as in-the-field actions (Mehrotra, Butss, Klashnikov & Venkatasubramanian, 2004; Sanz & al., 2007; Smirnov, Pashkin, Levashova, Shilov & Kashevnik, 2007). The information technology challenges focus on the systems and procedures to get the right information to the right person at the right time (Sanz & al., 2007; Ianella & Henricksen, 2007). RBAC can be used to control information sharing in the systems and to solve some of the information sharing obstacles. However, RBAC still requires improvements to function in a dynamic environment. Moreover, challenges are caused by relatively low integration of information and communication technologies in the emergency management field (Wybo & Lonka, 2002).

According to Haibin and MengChu (2006), role-based collaboration is a recent innovation, which pays attention to how productive collaborations can be maximized by manipulating role assignments and the configuration of teams. It is a new methodology for organizing collaboration by providing role specification, assignment, transition, and negotiation mechanisms. With these mechanisms, people in collaboration know their roles, thereby making collaboration more productive. Operative role management focuses in particular on the command and control activities of an emergency organization (Kurki & Sihvonen, 2012; Sihvonen & Kurki, 2010). It refers to managing the different roles that personnel can dynamically assume during an emergency situation. In emergency organizations, roles vary from operative field roles to tactical and strategic command, control and coordination roles and to administrative roles. Role transfers take place dynamically several times during emergency situations and shifts, and are largely based on verbal communications and face-to-face briefings. Even though a human user in collaboration cannot be physically changed, his/her role in collaboration may be changed (Sanz & al., 2006). In their work, Ianella and Henricksen (2007) describe how in a small incident one person could undertake the role of incident controller as well as the tasks of planning, operations, and logistics; in a medium-sized incident a person can be required in each of the four roles; and in a major incident dozens of people may be required to handle the various management functions. Role management is challenging, as a change in one role can initiate a series of role changes within and across organizational boundaries when forming situation-organizations (Zhu & Zhou, 2006).

Operative role management in information systems denotes management of real-world roles with integrated information system support. Operative work planning, command and control as well as field activities affect both information system role management and access control. This research concentrates on the practical work processes of the emergency management staff and not merely on information systems and their functionalities. This research illustrates how operative role management in information systems combines both technological and operative work approaches.