A multiteam international simulation of joint operations in crisis response

Sébastien Tremblay
Université Laval, Québec, Canada
sebastien.tremblay@psy.ulaval.ca

Rego Granlund
Santa Anna Research Institute, Sweden
rego.granlund@c3fire.org

Peter Berggren
FOI, Linkoping, Sweden
peter.berggren@foi.se

Marie-Eve Jobidon
Defence R&D Canada – Toronto, Canada
Marie-Eve.Jobidon@drdc-rddc.gc.ca

Martin Holmberg
FHS, Stockholm, Sweden
martin.holmberg@fhs.se

Paddy Turner
Cranfield University, Defence Academy, UK
p.turner@cranfield.ac.uk

Statement of Topic

A series of distributed experiments will address teamwork and its social, organizational and cognitive dimensions within the context of multinational joint operations in crisis response and management.

Significance and Relevance of the Topic

In most cases of multinational collaborations in relation to crisis response and management, multiteam systems (MTS) can be defined as a group of teams. Groups are generally defined as collections of individuals whose tenure together and shared goal is relatively impromptu and temporary, most often in response to a new event or need. Such a definition reflects the event-oriented nature of the formation of a multinational MTS and the fact that its units are teams of different backgrounds, often different languages and expert procedures. MTS are a key issue in international operations, both civilian and military, whereby different nations must collaborate to resolve a particular situation. When personnel from different organizations come together – with different backgrounds, training, and language skills – these differences undoubtedly impact upon team effectiveness. Both civilian (Falkheimern & Heidenn, 2006) and military (NATO RTO-TR-HFM-163, 2012) departments see this as an important concern. This poster introduces a functional simulation approach for studying how social, organisational and cognitive as well as cultural dimensions can affect MTS in a controlled environment that offers the best compromise of ecological validity and internal validity.

Abstract

Concepts such as trust, shared understanding, cultural differences, mental workload, and organizational structure all impact upon the effectiveness of an organization (e.g., Tindale & Kameda, 2000), and even more so in the context of large scale multinational operations (e.g, Smith, Granlund, & Lindgen, 2010). In order to study these concepts we plan a multinational, distributed experiment with participants from three nations collaborating in the same virtual environment: Canadian, British, and Swedish participants will work together as part of a multinational MTS to deal with a complex task and gain control of a crisis situation. Empirical research on MTS remains limited (see, e.g., DeChurch & Marks, 2006) particularly at the multinational level where the investigation of MTS has been so far focused on case studies and exercises (e.g., Goodwin, Essens, & Smith, 2012). Therefore, there is a need to empirically study multinational MTS in order to assess the specific issues that multinational operations face, notably cultural and languages differences. The simulation environment used as experimental platform for this project is C3Fire (www.c3fire.org, Granlund & Granlund, 2011). C3Fire creates an environment whereby teams must work together to resolve a crisis in the firefighting domain, with the goal of evacuating people in critical areas, putting out the forest fire, and protecting buildings and other areas of value from the burning forest fire. This platform makes it possible to study participants' collaborative processes when dealing with a set of crisis scenarios in the context of a simulated emergency response situation. To deal efficiently with the crisis management operation, participants need to prioritize between different objectives, identify and protect critical areas, and plan and implement activities based on given resources. All these tasks are distributed between team members, compelling participants to exchange information and coordinate within and between teams to execute the task. The task is divided into three areas of responsibility as follows: 1) Information and Planning, responsible for situation assessment and providing the operating picture; 2) Operation and Logistic, responsible for intervention and resource management; and 3) Search and Rescue, responsible for research and management of civilians. C3Fire is designed to: 1) achieve an optimal compromise between internal and external validity; 2) show flexibility in scenario configuration (spectrum of units and roles – including search and rescue functions; Tremblay et al., 2010), allowing researchers to capture emergency

response and crisis management and rapid response planning; 3) be highly configurable for testing many different types of teams (e.g., hierarchical vs. horizontal organizations); and 4) readily provide objective, non-intrusive metrics for assessing teamwork effectiveness (including macrocognitive functions and team processes) as well as quantitative measures of task performance (that take into account conflicting mission goals).

The objective of the first planned experiment is to provide an insight into the problems that three international teams may face in managing the simulated world. Each team will consist of three participants within a hierarchical organization, and two different types of organizational structures can be compared. In the first type, each "national" team will possess the expertise and resources required to deal with the crisis situation, but not in quantity sufficient to allow one team to complete the task on its own (Figure 1). In the second type of organization, each "national" team will possess a distinct functional role (resources, expertise) (Figure 2). It is hypothesized that the latter type of organization will require greater collaboration – higher level of interdependencies – and may also benefit in efficiency from less overlap in expertise.

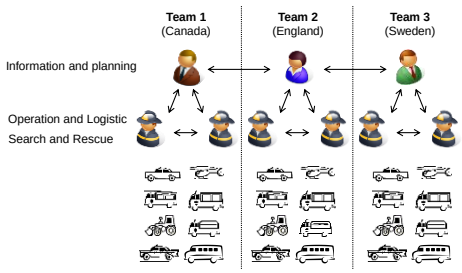

Figure 1. Multifunctional Organization.

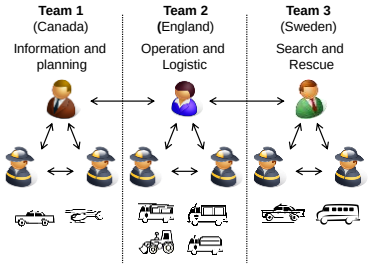

Figure2. Functional organization.

In addition to the objective performance-oriented taskwork and teamwork metrics that have been developed within the C3Fire environment (see, e.g., Lafond, Jobidon, Aubé, & Tremblay, 2011) and questionnaire-based measures of social concepts such as group potency, goal commitment and transactive memory, other measures will be included in the study. These measures are concerned with key issues in multinational Command and Control (C2): trust, cultural skills and inter-team mutual awareness. Another important issue that will be assessed is the potential language barrier, which can be even more at play in crisis situations characterized by information overload, stress, time pressure and safety-critical decisions. The C3Fire microworld constitutes a highly flexible testing platform for research in C2, teamwork and decision-making in emergency response and crisis management, which can serve to simulate multinational joint operations and provide a window into the cognitive, cultural, social and organizational factors of multiteam systems.

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