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# Collaboration Exercises in Emergency Work: Outcomes in Terms of Learning and Usefulness

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**Abstract.** In this study we reviewed scientific papers which measured the effect of collaboration exercises in terms of learning and usefulness. The question to be answered was: Do collaboration exercises contribute to learning that is useful in actual emergency work? The point of departure was the perception that exercises improve handling logic and actions that increase security and safety in the community. However, the organizations involved in emergencies are regarded as inflexible, conservative, and non-collaborative. Data was collected in three steps. In the first step, studies of collaboration exercises in a crisis context were selected. In the next step, studies focused on the outcome of collaboration exercises in terms of learning and usefulness were identified. Out of 564 articles, seven were selected. The data from all included articles was collected by a common questionnaire in the included studies. The instrument measured learning and usefulness on a 5-point Likert scale, from strongly disagree to strongly agree. A total of 477 participants responded to the surveys. The mean within the learning dimension was 3.54 (SD = 0.62), and the mean within the usefulness dimension was 3.64 (SD = 0.65). The results showed that a developed type of exercise that included room for seminars resulted in a higher degree of learning and usefulness than the rest of the exercises studied.

**Keywords.** Collaboration exercises, learning, usefulness, high-reliability organizations, review

## 1. Introduction

There is a widespread assumption that exercises prepare individuals, rescue teams, organizations, and authorities to be better at managing emergencies, from accidents to disasters [1–3]. Fifteen years ago, Perry (2004) wrote a classic article on exercises. He was, to the best of our knowledge, the first one who examined the effects of exercises on professional emergency personnel. Perry showed that the outcome of exercises was rather limited, even though exercises are continuously conducted, with the assumption that they contribute to a safer society [4]. In this study we review scientific studies which

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measured the effect of collaboration exercises in terms of learning and usefulness. The question to be answered was: Do collaboration exercises contribute to learning that is useful in actual emergency work?

The context of the review is studies on collaboration emergency exercises between organizations in the blue-light community, health care, sea-rescue services, coast guard, army, and voluntary organizations acting during accidents and disasters. The point of departure is the perception that exercises improve handling logic and actions that increase security and safety in the community. However, the organizations involved in emergencies since the 1960s have been regarded as inflexible, conservative, and non-collaborative [5,6]. We use the concept of "mechanistic" as a contrast to collaboration in order to underline the need to adapt to the structure that best fits the surroundings [7].

## 2. Background

Previous studies have pointed to the problem of closed organizations, internal bureaucracies, and comprehensive decision hierarchies in high-reliability organizations [8,5]. Shapira showed that management staff often have an exaggerated confidence in their ability to exercise complete control, denying shortcomings and believing in their ability to manage complex situations in a quick turn of events. Such an approach contributes to a mechanistic action logic. The logic is fixed, linear, and rigid, and the actions follow a fixed and previously trained pattern of standardised models and tactics [9]. In a mechanistic tradition, duty and obedience dominate, rather than flexibility and collaboration [10,11]. Consequently, organizations tend to work in parallel rather than cooperatively and often have difficulty in understanding each other's concepts, particularly organizational models, action logics, agendas, legislation, and hierarchical levels [12,13].

However, during the past decades, collaboration has become a predominant organizational trend [14,15]. It has come to be a solution for organizational fragmentation and professional task distribution [16]. Collaboration is considered as decentralising and efficiency promoting [15], and a horizontal seamless and prestige-less process is considered to be able to break traditional organizational boundaries [17]. In research on crisis management, flexibility is emphasized as a key feature to successfully handle incidents [18]. Bjørnstad studied the flexibility, effectiveness, and alignment from survey data based on North Atlantic Treaty Organization (NATO) force exercises. She found that flat structures and decentralized processes predict organizational effectiveness with almost full mediation by flexibility [19]. Deverell argued that despite the fact that flexibility is regarded as being important, how this flexibility should be operationalised is very rarely discussed [20].

The concept of collaboration in this study is considered as a way for employees from different organizations to work across boundaries to achieve a common goal. This is based on Drucker's understanding of collaboration as a type of remedy to organizational fragmentation and professional task distribution [16].

During the past decades, collaboration has become a major organizational trend. It is thought that collaboration has a decentralising, democratising, and efficiency-promoting effect. Collaboration as a horizontal, continuous, and prestige-less process is considered to be able to break outdated organizational limitations [14]. However, Ridley argued that collaboration has become an idealized concept but takes place more as an exception rather than a rule. Collaboration, according to Ridley, is a reflexive response developed from the gain that results from exchanges in human societies. Successful collaboration

therefore forms a pattern contributing to further collaboration [21]. Such a definition emphasizes the fact that both explicit and implicit gains are considered before making a decision to collaborate.

Even if collaboration exercises are conducted regularly in order to strengthen the community's ability to deal with accidents and disasters, they do not automatically mean that collaboration takes place smoothly [22]. An organization whose members bear a collective self-image to always be in the first ranks and have a high level of competency can find it difficult to stand aside and leave room for others. This may lead to a distorted selectivity in the handling of the accident. Members from each organization choose to act following established behaviours and a well-known action repertoire [23].

Exercises, however, take place in all countries on all continents of the world. They are done on a general level and with operational staff. They can be about desktop exercises with simulations [24] or full-scale exercises under field conditions where staff are gathered and carry out extensive practical sessions [25].

Emergency exercises are mainly of two types: a drill that is carried out within the respective organization, or collaboration exercises that are carried out between organizations. The drill is designed as an exercise in which the same behaviours are performed repetitively until they reach perfection. It involves training in techniques and manipulations based on mechanistic logics [26]. The collaboration exercise, instead, has an organic focus. Its purpose is to get participants from different organizations, with different professions, to collaborate to handle a complex event [27].

The expectation is that the exercise teaches participants to handle the incident better than they otherwise would have done [28,29]. Sinclair et al. suggested that there is an underlying assumption that if we spend time and resources on exercises, then the organizations will be better prepared to deal with threats, risks, and emergencies. This is based on the supposition that learning is one of the benefits of exercises. Gredler pointed out that a beneficial exercise results in new patterns of thought that are considered useful during actual events [30].

In this paper some of the few attempts to measure the learning and usefulness of exercises are reviewed.

## 3. Method

Data was collected in three steps: (1) studies of full-scale collaboration exercises in a crisis context were selected; (2) studies focused on the outcome of collaboration exercises in terms of learning and usefulness were identified; and (3) quantitative studies based on data from questionnaires were selected. The reason was to find comparable articles that allowed analysis on a meta level. Relatively few of the studies presented a definition in connection to the studied exercises. The exercises were addressed as collaboration exercises or exercises aimed to practice inter-organizational collaboration.

In the first step, 564 articles were found. In the next step, adding the outcome of collaboration exercises, 429 articles were excluded, and 135 articles remained. After narrowing the search by including methodological keywords, there were still 40 articles. After reading the abstracts of the articles, only five articles studying full-scale field exercises fulfilled the inclusion criteria. Cross-referencing from the remaining five articles, however, added three more articles.

Data from the articles was distributed by scenarios and participants. The outcomes in terms of learning and usefulness were added and analysed.

The data from all seven articles was collected by a common questionnaire, the Collaboration Learning Usefulness instrument, consisting of the dimensions of collaboration, learning, and usefulness. The instrument was developed to measure the effects of collaboration in crisis contexts. The dimensions and items were made from a model of theories on first- and second-degree learning from the collaborative elements of the exercises [12]. The instrument measured learning and usefulness on a 5-point Likert scale, from strongly disagree to strongly agree. The learning dimension mirrored lessons learnt from activities during the exercises. The usefulness dimension evaluated whether the exercise was perceived as useful during actual events. The three dimensions in the included studies reported Cronbach's alphas of 0.67 to 0.88.

Since the data from the included articles was from the same instrument, the means and standard deviations were comparable. The results were added up to a total sum [31].

## 4. Results

A total of 477 participants responded to the surveys, of whom approximately half used paper surveys and the other half (252 participants) used a web-based survey. The response rate was more than 60% (range 17%–95%). Their ages ranged from 18–55+. Most of the participants belonged to the public sector in Norway and Sweden, e.g. blue light community, army, health care, and coast guard. A few belonged to private and volunteer organizations such as the Red Cross and the Sea Rescue (7%). The participants belonged to a range of 3–27 organizations. Collaboration exercises on shore, such as traffic accidents, in most cases involved blue light organizations, i.e. police, ambulance, and fire departments, and exercises in maritime contexts involved several public and voluntary rescue services, the merchant navy, and both on- and off-shore organizations (Table 1).

The majority of the respondents indicated that they learnt new things and especially something new about the collaborating organizations involved in the exercise. Some of the respondents also learnt some new concepts, acronyms, and prioritising activities by collaborating organizations. The mean within the learning dimension was 3.54 (range 3.03–3.78, SD = 0.62). Within the dimension of usefulness, most of the respondents considered the exercises to be useful during actual emergency work. They also regarded the collaboration exercises to have an effect on their everyday work. Most of the respondents considered the exercises to be more valuable to the command officers than to the operative staff in the field. The mean of the usefulness dimension was 3.64 (range 3.09–3.72, SD = 0.65) (Table 2).

The results from one of the articles, "The three-level collaboration exercise: Impact of learning and usefulness", by Berlin and Carlstrom [25], showed a higher degree of learning and usefulness than the rest. The mean result in the learning dimension was 3.78 (SD = 0.62) and in the usefulness dimension 3.72 (SD = 0.64). The collaboration exercises in the article differed from those studied in the rest of the articles. The seven exercises studied were constructed according to a method named three-level collaboration (3LC). The method was characterized by collaborative challenges built into the scenarios. The idea was to evaluate the perceived learning effects and usefulness of such exercises' design in such a way that employees from different organizations were challenged to seamlessly overlap each other's tasks. This was carried out by including asymmetries into the scenarios and testing different collaborative strategies in order to find a successful approach.

**Table 1.** Distribution of studies, exercise scenarios, number of involved organizations and participants.

| Published | Exercise/Scenario | Number of Organizations Involved in the Exercise | Number of Participants in the Study |
|---|---|---|---|
| Berlin, J., & Carlström, E. (2015). Collaboration exercises. What do they contribute? A Study of Learning and Usefulness. *Journal Of Contingency and Crisis Management, 23*(1), 11–23. | Ferry accident | 3 | 39 |
| Berlin, J., & Carlström, E. (2015). Collaboration exercises. What do they contribute? A Study of Learning and Usefulness. *Journal Of Contingency and Crisis Management, 23*(1), 11–23. | Fire at school | 4 | 28 |
| Berlin, J., & Carlström, E. (2015). Collaboration exercises. What do they contribute? A Study of Learning and Usefulness. *Journal Of Contingency and Crisis Management, 23*(1), 11–23. | Fire at work | 4 | 27 |
| Berlin, J., & Carlström, E. (2015). The three level collaboration exercise: Impact of Learning and Usefulness. *Journal of Contingency and Crisis Management, 23*(4), 257–265. | 4x Traffic accident, house and car fire, train accident, chemical accident | 3 | 131 |
| Sorensen, J.L. (2017). *Norwegian maritime crisis collaboration exercises: Are they useful?* Graduate Faculty of the School of Business and Technology Management, Northcentral University. Proquest Dissertations Publishing. Id: 10289232. | Oil spill and search and rescue | 21 | 79 |
| Magnussen, L.I., Carlstrøm, E., Sørensen, J.L. Torgersen, G.E., Hagenes, E.F., & Kristiansen, E. (2018). Learning and usefulness Stemming from Collaboration in a Maritime Crisis Management Exercise in Northern Norway. *Disaster Prevention and Management: An International Journal, 27*(1), 129–140. | Maritime search and rescue | 22 | 53 |
| Sorensen, J.L., Magnussen, L.I., Torgersen, G.E., Christiansen, A.M., & Carlström, E.D. (2018). Perceived Usefulness of Maritime Cross-Border Collaboration Exercises. *Arts Social Science Journal, 9*, 361. | Maritime search and rescue | 8 | 30 |
| Sorensen, et al. (2018). The Organizer Dilemma Outcomes from a Collaboration Exercise. (Submitted and under review). | Maritime search and rescue | 27 | 90 |
| Total | | 92 | 477 |

**Table 2.** Mean learning and usefulness (SD) of six studies from 15 different collaboration exercises based on data from the Collaboration Learning Usefulness instrument.

| Exercises | |
|---|---|
| Learning | 3.54 (0.62) |
| Usefulness | 3.64 (0.65) |

## 5. Discussion

The learning effect in this review was limited to 3.54 on a 5-point Likert scale. The result is promising, but there is still room for improvement. Boin et al. argued that accident work does not automatically mean that collaboration takes place smoothly. The organization which is built up is based largely on the preconditions created at previous meetings. The challenge to improve collaboration calls for exercises contributing to learning. Such exercises can add to a smooth inter-organisational handling [32].

The mediocre result can be traced to a vague comprehension of collaboration during exercises. The existing literature has identified a number of problems with exercises. The exercises can have different and competing purposes, even if the concept of collaboration is used [18]. Although collaboration seems to be the goal, in reality the drill has been dominant [26]. Each organization tends to set its own priorities and focus primarily on its own specific tasks instead of looking at the big picture. In addition, the participants seem happy to do tasks that they are used to doing but are passive when some unknown task needs to be performed [12]. However, the idea with a collaboration exercise is that the practising organizations not only focus on their own limited tasks but are also prepared to reach out and mutually help each other across organizational boundaries. This requires them to practise re-prioritisation and to shift focus during the exercise [26].

Other reasons for the varying results can be differences in culture within crisis contexts. Collaboration offshore and onshore can differ in character and practice depending on traditions and regulations. Furthermore, even if Norway and Sweden are considered as quite similar in terms of national emergency principles, there are potentially some differences in culture and organizational structures that may have impact on collaboration, learning, and usefulness during exercises.

However, the results showed that developed types of exercises, e.g. the 3LC exercise, included room for seminars, which is considered as a prerequisite for learning [30]. Moynihan has shown that learning is particularly effective when employees come together for reflection, discussions, and evaluations in open forums that are held at the end of the exercise. Based on careful planning, evaluation can provide opportunities to test both effectiveness of emergency plans and the abilities of personnel to execute them [33]. Sinclair et al. emphasized the need to use experienced facilitators during debriefings in order to properly evaluate the results of the exercise. The use of specific questions that arise from the achievement or non-achievement of objectives can acknowledge good performance [29].

According to Rolfe et al., a prerequisite for achieving learning is that the scenario simulates reality, so that participants get to experience what could have happened at an actual event. The aim is to give participants a degree of realism [34]. To plan instructive, appropriate, and effective exercises, however, is a difficult challenge [28], especially if the aim is to improve preparedness in order to collectively be able to handle difficult phenomena [35]. Scholtens criticised the dogma of supreme command and operational

leadership and suggested collaboration and individual decision making in order to achieve effective preparation [36].

In accordance with this review, Perry demonstrated that exercises led to a better understanding of the other organizations' ways of thinking and acting. Perry reported that before the exercises were carried out, the understanding between the fire department and police personnel was low. The police had little confidence in the participating fire departments' ways to organize themselves. Conversely, ambulance service personnel had only a vague idea of the police management. Both of these deficiencies were improved as a result of inter-organizational learning. Based on Perry's results and this review, exercises have a certain effect on learning and usefulness [4].

An exercise that generates learning may increase the ability to integrate organizations at the accident site. Gredler pointed out that a useful exercise results in new patterns of thought that are considered useful at actual events [30]. Learning, thus, stands for change and development [28]. The opposite of change is stability caused by a mechanistic logic, that is, organizations that continue to strengthen the internal drill but without being integrated with other activities. In contrast, learning may contribute to the ability to shift strategies depending on the actual situation and not getting stuck but being open to different options in collaboration with others to achieve the quickest and best results [27,37].

### *5.1. Limitations*

This review was based on studies of exercises from different contexts and two countries. The number of articles is still quite insufficient when pooling data for a meta-analysis. In order to verify the results, more context-specific studies on exercises have to be performed.

### *5.2. Conclusion*

This review of scientific papers measuring the effect of collaboration exercises in terms of learning and usefulness showed a limited learning effect of 3.54 on a 5-point Likert scale. Even if the result is promising, the result indicates that there is still room for improvement. The result can be traced to a vague comprehension of collaboration during exercises. The results, however, did identify the practice of seminars as contributing to a sufficient degree of learning and usefulness.

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