RESEARCH

Building collaboration and trust in emergency preparedness: a model for planning collaboration exercises

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Abstract

Collaborative preparedness exercises are essential in emergency management. In this conceptual paper, we examine the planning processes of emergency preparedness collaborative exercises, aiming to develop a model that enhances learning, collaboration, communication, and trust among participants. We propose a model that guides the planning of collaborative preparedness exercises, focusing on creating and maximizing knowledge among participants. The model emphasizes the importance of defining clear learning objectives, selecting engaging scenarios, and incorporating flexible exercise designs to improve effectiveness. By systematically integrating communication and trust-building strategies across planning, execution, debriefing, and evaluation phases, the model seeks to foster a collaborative environment conducive to shared learning and decision-making. This conceptual study contributes to the literature by offering a structured approach to exercise planning that could enhance the competencies of emergency preparedness organizations and improve collaborative efforts in crisis management. Future research could apply this model in practice and empirically evaluate its impact on emergency preparedness exercises across various sectors.

Introduction

Collaborative exercises are a major focus of emergency preparedness and planning because they serve as a particularly effective learning method for sharing and aligning participants' knowledge. Different organizations may rely upon collaboration exercises for improving collaboration and dealing with serious incidents in an optimal manner (Berlin and Carlström 2015). Emergency preparedness exercises enhance collaborative skills among emergency preparedness actors (Van Wart and Kapucu 2011). Further, ongoing discussion in the literature centers on the effect of collaboration exercises in enhancement of trust among the actors involved (Roud et al. 2020). Therefore, creation and retention of knowledge in collaborating for emergency preparedness is important, given the critical nature of collaboration. Didactical and pedagogical planning are therefore important steps in collaborative exercises.

Exercise planning plays a crucial role in the success of conducted exercises for achieving learning goals, enhancing knowledge, fostering varied expertise exchanges, building trust, and promoting collaborative learning among participants, teams, and organizations. An effective planning process, characterized by meticulous plan reviews and thoughtful critiques of emergency exercises, offers valuable alternatives for learning from experience (Kartez and Lindell 1989). Based on this, there are some suggested practical guidelines issued to help practitioners in planning processes of exercise design within various emergency preparedness sectors (e.g., Aas-Hansen et al. 2023; European Centre for Disease Prevention and Control 2021; Eikelmann et al. 2017; The Norwegian Directorate for Civil Protection, 2016).

However, collaboration exercise planning designs should not only create intended learning outcomes, scenarios and content, they should also develop strategies for achieving and maximizing the exercise participants' learning

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(Elvegård and Andreassen 2023). Thus, a critical need to conceptualize and explore the scientific underpinnings of emergency preparedness exercise planning arises. Additionally, discussions on optimizing the planning process are essential to foster greater trust and enhance learning in emergency preparedness collaboration.

From this background, this study aims to develop and discuss a model for planning emergency preparedness collaboration exercises. Further, it explores the effect of different exercise planning steps in achieving greater trust and maximizing collaborative learning. Therefore, this conceptual study contributes to the literature by offering a structured approach to exercise planning that could enhance the competencies of emergency preparedness organizations and improve collaborative efforts in crisis management.

This paper is designed utilizing a conceptual model-approach (Jaakkola 2020). As Jaakkola (2020) argues, a conceptual paper can bridge existing theories in interesting ways or link work across disciplines. Accordingly, Jaakkola (2020) has suggested four main types of conceptual design approaches (theory synthesis, theory adaptation, typology, and model). The practice literature in emergency management is rich in various designs; however, a conceptualization model is needed to explain and predict how each planning phase may enhance the experiential learning from collaborative exercises that could result in trust building. In this way, a methodological model could help clarify how strategizing various collaborative elements at each step may lead to various outcomes. Accordingly, this study discusses different elements in collaborative exercise planning, sourced from the emergency management literature (see Table 1), as well as the practices of the co-authors, who are professionally engaged in crisis management training at the Center for Crisis Management and Collaboration at Nord University in Norway.

Comparison with recent studies

This study builds on the existing literature by integrating comprehensive planning steps with trust-building and communication strategies. For example, by building on Wilson (2000), our study offers a more holistic and integrated approach to planning emergency preparedness exercises, highlighting the critical roles of trust, communication, and flexible learning strategies to enhance collaborative efforts in crisis management. Furthermore, our study expands on the work of Berlin and Carlström (2015) by incorporating the need for flexibility in exercise design. Additionally, we align with Badu et al. (2023) and Roud and Gausdal (2019) on the significance of trust in emergency management, and we extend their work by detailing specific trust-building

and effective communication strategies during the planning phase (see Table 1).

This study conceptually contributes to the existing body of literature by suggesting a comprehensive model for planning emergency preparedness exercises and further explaining how different steps in this process enhance learning from the exercise experience, collaboration, and trust building. The proposed model is based on the literature review and the authors' own experiences with emergency preparedness exercise planning at the Center for Crisis Management and Collaboration – NORDLAB. The proposed model can be used and validated through practical tests during empirical studies, potentially opening avenues of new knowledge landscapes within experiential learning.

This conceptual paper is organized as follows. The next section provides a comprehensive theoretical overview of the literature on the need for communication, trust, and collaboration in emergency preparedness. Subsequently, we elaborate on the different steps in exercise planning and summarize them in a proposed model. The discussion section examines the steps presented considering trust building and experiential learning for collaboration. In particular, we discuss the steps that optimally utilize participants' prior experiences and knowledge for the transfer and maximizing of new collaborative knowledge. Lastly, we present some conclusions and reflections about the proposed model and future studies.

Theoretical framework

Collaboration, communication, and trust in emergency preparedness

Emergency preparedness is a transdisciplinary field that requires collaborative efforts from government agencies, non-governmental organizations, the private sector, industry and communities. To promote collaboration in this field, the relationship between effective communication and trust among actors is fundamental (Badu et al. 2023; O'Leary and Vij 2012). Thus, for actors to successfully collaborate in their activities, exploring the dynamics of these relationships and their impact on emergency management is necessary.

Collaboration is usually defined as "any joint activity by two or more agencies that is intended to increase public value by working together rather than separately to achieve a specific goal" (Bardach 1998, p.8). In the context of large-scale emergency management, collaboration within and between emergency response agencies is essential to successfully address multiple challenging tasks. Therefore, collaborative efforts in emergency management are fundamental for

Table 1 Insights from previous studies relevant for planning of collaboration emergency preparedness exercises

Study	Key focus of findings	Step in the exercise planning / or overall focus on, communication or trust during planning of collaboration exercises
Wilson (2000)	The need for training processes and understanding the diverse ways of learning	Execution, learning objectives
Dirks (2000)	Emergency groups have a greater chance of developing trust by exchanging knowledge in evaluation	Evaluation, debrief and reflection
Borodzicz and Van Haperen (2002)	Usefulness of planning for individual and group learning	Execution, resources, types of exercises
Donahue and Tuohy (2006)	Important to indicate the shortcomings and highlight potential improvement areas	Evaluation
Faraj and Xiao (2006)	Importance of information flow for overall coordination	Communication
Kapucu (2006)	Importance of communication thin emergency management networks	Communication, reflection
Trnka and Jenvald (2006)	Different types of exercises can be implemented for collaborative purposes	Exercise types
Moynihan (2009)	Open collaborative fora enhance learning between crises or exercises	Evaluation, reflection
Van Wart and Kapucu (2011)	Different collaboration competences	Learning goals
Hovmand et al. (2012)	Appropriate scripts can be tools for collaboration	Execution
O'Leary and Vij (2012)	Relationship between effective communication and trust among actors is fundamental	Execution, communication, trust
Seppänen et al. (2013)	Collaboration enables sharing of resources and critical information	Trust, training audience
Kim (2014)	Learning occurs in discussion-based debriefs focusing on learning points	Evaluation, debrief & reflection, exercise types
Berlin and Carlström (2015)	Importance of collaborative elements in scenarios	Scenario, exercise type, resources, execution
Faber et al. (2017)	Importance of instilling trust in the participants for effectiveness of the evaluation	Evaluation, trust
Tena-Chollet et al. (2017)	Review of existing strategies for training	Exercise type, execution
Roud and Gausdal (2019)	Trust is crucial for effective inter-agency collaboration	Trust
Carlström et al. (2019)	Collaboration exercises outcomes in terms of learning and usefulness	Learning Objectives, evaluation, exercise types
Kristiansen et al. (2019)	Effective communication during exercise enhances collaborative skills	Communication, execution
Roud and Gausdal (2019)	Collaborative efforts in emergency management are fundamental for enhancing preparedness	Execution, communication
Roud et al. (2020)	Contribution of different types of collaboration exercises	Exercise type, learning goals
Beerens et al. (2020)	Usefulness of evaluation descriptions	Evaluation, communication
Molin et al. (2021)	Role of feedback method for effective learning	Evaluation, debrief and reflection, exercise execution, trust
Elvegård and Andreassen (2023)	Flexible design enhances engagement and learning outcomes	Learning Objectives, scenario, training audience, execution, evaluation, reflection
Badu et al. (2023)	Trust and communication are important two sides of the same crisis management coin	Trust, communication
Badu (2023)	Importance of building proactive trust in the pre-crisis phase	Trust
Andreassen et al. (2024)	Need for guided evaluation to enhance learning and cognitive motivation	Evaluation, debrief and reflection

developing strategies that enhance preparedness, streamline response activities, and facilitate recovery (Roud and Gausdal 2019). Such collaboration enables the pooling of resources, sharing of critical information (Seppänen et al. 2013), and alignment of strategies and policies (O'Leary and Vij 2012), which collectively improve the efficiency of emergency response and mitigation efforts. Furthermore, collaboration helps build and sustain the necessary proactive trust among actors, ensuring that when emergencies occur, the groundwork for cooperative action is established (Badu 2023).

Collaboration in emergency preparedness presents several significant challenges that impede effective emergency management. Some of these challenges include diverse organizational cultures and structures that often lead to misunderstandings among actors. Hence, aligning multiple agencies with different priorities and procedures becomes a challenging task (O'Leary and Vij 2012). Moreover, potential communication barriers such as limitations in communication infrastructure and a general lack of information regarding collective situational awareness could hinder coordination in emergency management (Chen et al. 2008). Additionally, establishing and maintaining trust among various actors is difficult, especially under high-pressure conditions typical of emergency situations, where trust is crucial for effective cooperation and coordinated responses (Badu et al. 2023).

Effective communication and trust strategies can help address some of the challenges of collaboration in emergency management (Badu et al. 2023). For instance, focusing on communication, information search, exchange, and feedback could assist in building inter-organizational emergency response capacity (Comfort and Kapucu 2006). Accordingly, effective peer communication at the incident site during exercise could enhance collaborative skills among responders (Kristiansen et al. 2019; Seppänen et al. 2013). Comfort (2007) states that communication in emergency management practices should not only focus on the interoperability of mechanical devices but also involve the creation of shared meanings among individuals, organizations, and groups, since a lack of clear communication may result in inadequate shared situational awareness (Seppänen et al. 2013, p.2).

Furthermore, trust is vital for building a cooperative environment, where agencies are confident of each other's abilities and intentions (Mollering 2006; Roud and Gausdal 2019). Seppänen et al. (2013) contend that without trust, communication strategies are ineffective as actors do not share their information and knowledge, even if technology and collaboration plans are in place. Thus, trust in emergency management could be achieved through diverse factors such as connections, communication, direction,

resource sharing, and joining temporary (ad hoc) groups (Gausdal 2012). Here, Gausdal (2012) argues that the initial stage of "connection" involves face-to-face interactions amongst individuals from diverse organizations to facilitate rich communication. This sets the stage for the increased and collaborative communication that typically occurs during the negotiation phase. As relationships progress into the formation stage, the focus shifts on establishing a common ground (a unified set of language, values, and objectives). The trust built during this stage is influenced by the direction of collaborative development. Commonly, collaborative actors operate with limited resources such as time, personnel, equipment, and infrastructure. This act of resource-sharing can also influence the development of trust (Gausdal 2012; Roud and Gausdal 2019).

Establishing trust before an incident, especially during the planning stage, can enhance cooperation between diverse groups during the emergency management process (Kapucu 2006). According to Boin and Hart (2003), timing is crucial throughout the response phase. As a result, participants should coordinate and communicate in order to act quickly, which should help to build adaptive trust (Badu 2023). In the evaluation phase, which takes place outside of actual events, emergency groups have a greater chance of developing trust by exchanging knowledge and learning from past failures (Dirks 2000).

The integration of communication and trust strategies amongst different organizations may result in more cohesive and effective collaborative emergency preparedness efforts. These approaches not only mitigate the impact of operational differences, but also help build a resilient environment capable of an effective emergency response.

Experiential learning from collaborative exercise

Collaborative exercises play a crucial role in experiential learning for emergency managers and crisis teams. Learning from experience is a common framework that highlights the usefulness of collaborative exercises in enhancing emergency preparedness (Carlstrom et al., 2019). Thus, collaborative exercises provide experiential learning opportunities (Kayes et al. 2005). Exploring the inter-connection between learning and personal experience, Dewey (1938) explained that experiences should be cumulatively linked to one another. However, when conducting exercises involving unpredictable situations, learning outcomes may be too abstract. Hence, participating in an exercise may not necessarily lead to learning. An experience may only become meaningful when it is connected to an understanding of learners' roles in practice. Kayes et al. (2005) states that learning from experience requires committed participants who can engage in reflections and dialogue as well as

experiment with their decision making and actions. Further, it is important that earning experiences arise from the participants' curiosity and a desire for richer experiences in the future, for instance, through other exercise forms (Vakola, 2014). Hence, maximizing learning implies collaborative knowledge creation through the learning and exchange of expertise and reflections from the actors involved.

For decades, problem-based learning approaches have championed the success of experiential learning in fostering cross-agency communication and as an effective training method for meeting local and national emergency preparedness objectives (Streichert et al. 2005). Rather than using the traditional content-centered approach in which well-defined facts and concepts for training are imparted to classroom participants, problem-based learning encourages learners to actively engage in and facilitate problem solving. The exercise participants collaborate in groups to identify the knowledge and skills necessary to address real-world challenges. By creating dialogue or discussion spaces in collaborative exercises, team members can reflect on their experiences and discuss potential joint crisis management strategies (Koschmann 1999). A dialogic approach to collaboration involves recognizing that actions, communication, and cognition are essentially related and dependent on the situational context (Faraj and Xiao 2006). Maximizing learning also refers to strategies for accumulating and retaining knowledge among participants and organizations.

Previous studies have revealed that collaboration exercises contribute to useful learning in the actual emergency work of professional emergency personnel; however, more studies are needed to undertake an in-depth examination of the elements of an exercise and learning environment (Tena-Chollet et al. 2017).

Exercise design for collaboration

Exercise design may help set up certain learning strategies for participants with various practice backgrounds, individual learning styles, and professional roles as emergency preparedness participants are usually adult learners with different competencies and skills (Thomas 2018).

Wilson (2000) outlines several essential steps for designing effective emergency management exercises. Exercise design encompasses the fundamental steps for the systematic planning of all exercise-related activities. This involves strategic planning to maximize learning and develop the competencies necessary for effective performance. When planning an exercise design, choices must be made regarding the purpose and content of the exercise, learning strategies and methods, theoretical considerations, participants' alignment with learning outcomes, and subsequent assessments.

From this perspective, the following collaborative exercise design steps are proposed.

Defining purpose and learning outcomes with collaborative participants

Exercise planning involves paying attention to both the purpose of the exercise and learning objectives. Therefore, the first step in exercise design planning is to plan learning outcomes needed for enhancing various skills and competencies to deal with complex situations as well as facilitate collaborative learning.

In collaborative exercises, it is crucial for all participants to contribute towards achieving the purpose of the exercise and the desired learning outcomes. Sometimes, particularly in unforeseen scenarios, the specific learning outcomes may be unknown (Torgersen and Sæverot 2016). For decades, problem-based learning approaches have been effective for training and exercises to meet local and national emergency preparedness objectives (Steichert, 2005). Therefore, to foster effective collaboration, collaborative purposes for the exercise should be clearly defined.

Choosing scenario and exercise type

Reflecting on past experiences and learning from them can significantly improve our ability to communicate and make informed choices collectively with colleagues or other actors. According to Stemn et al. (2018), incidents should not be viewed as disappointments but rather as valuable lessons. By extracting insights from incidents, sharing them throughout the organization, and using them to choose scenarios for exercises, we can proactively prevent or mitigate future events. The scenario should be realistic enough to provide settings for the participants to recognize and connect their experiences, knowledge, or usual functions. By valuing incidents as opportunities for growth, organizations can collectively build a more resilient and proactive future.

In emergency management, scenario-based learning is often based on historical events. Crisis scenarios serve as effective tools for both organizational and individual learning. Learners engage in complex scenarios, discovering organizational roles, responsibility divisions, and actions. Berlin and Carlström (2015) reflected on the importance of choosing collaborative elements when planning scenarios. They argued that perceived learning in collaboration exercises does not depend on the task as such but on known tasks completed while collaborating with others. Another crucial aspect is that each individual enters the exercise arm with a professional expertise. They encounter scenarios in which they must adapt, collaborate, and jointly make decisions alongside colleagues with diverse professional skills

(Scholtens 2008). This necessitates honing the ability to listen actively, comprehend varying priorities, and communicate effectively. Ultimately, optimal judgments are made by considering a holistic perspective (Berlin and Carlström 2015).

Moreover, Berlin and Carlström (2015) recommend that a scenario should include elements of resource scarcity. One way to achieve this is to ensure that not all organizations are sufficiently represented, thus forcing participants to collaborate and exercise, taking over other tasks. Thus, if a particular professional expert is absent, collaborative elements assist in accomplishing an understanding of the resource optimization.

The following different types of exercises can be implemented for collaborative purposes: tabletop, role-play, functional, simulator-based, or real life (Trnka and Jenvald 2006; Tena-Collet et al., 2017). Each type has its pros and cons, and the choice of the exercise type should be based on the purpose and learning objectives one wishes to achieve. A tabletop exercise is the most commonly used form and is suitable for discussing the roles, responsibilities, and regulations of both individual and organizational levels of collaboration in a stress-free environment. A roleplay or game exercise consists of learners and a counterplay, where participants simulate collaboration within an operation (Trnka and Jenvald 2006). In functional exercises, participants practice using a system's functions or use actual procedures for formal collaboration (Aas-Hansen et al., 2022). Simulator-based exercises provide an overall understanding of an incident (Roti and Elvegård 2018). Whereas real-life exercises usually focus on specific tasks and mobilize various actors, including stakeholders, emergency services, and residents. They are difficult to organize and are often one-shot exercises (Tena-Collet et al., 2017).

Identifying training audience and resource planning

Since collaborative competencies are needed to facilitate the utilization of the involved actors' capacities, an interaction of the maximum possible participants is preferable. In this step we need to identify those who need to be trained and the type of knowledge, skills, and attitudes that needs to be experienced by people or groups (Wilson 2000). Working together for a specific goal or purpose during an exercise should bring about a common understanding (Aas-Hansen et al., 2022).

To promote collaborative practice, participants with hands-on experience in handling complex situations during real incidents must be included. By conducting exercises that explore unpredictable situations and response challenges that cannot be completely solved, the existing knowledge of the training audience, their organizational positions, and

professional interests may lead to different interpretations of the situation and possible response actions. Although solutions for handling situations do not appear immediately, a better understanding and mastery could be achieved through reflection and discussion.

Planning for exercise execution

Planning for exercise execution includes preparing all background materials and documents for the planning group. Collaborative exercise design for working professionals must adopt pedagogical approaches that recognize the trainees' specific needs and backgrounds (Elvegård and Andreassen 2023). Thus, background materials should comply with what actors utilize on a day-to-day basis. It is essential to prepare background materials in advance to determine an exercise's starting point and to align mutual expectations. Collaborative thinking and learning outcomes influence the choice of background materials in relation to the participants' experience level.

In some types of exercises, scripts are used to structure the exercise development. Hovmand et al. (2012) assert that documented scripts may effectively engage diverse sets of stakeholders, where conflict and coordination issues may act as major barriers to solving system problems. Therefore, scripts should be planned to address collaboration problems. Further, more explicit exercise planning is required of the team planning the sessions by having the facilitators negotiate and internalize the criteria and values underlying the scripts. However, the difficulties encountered in collaboration may be attributed to several reasons, which may require other methods for solving these problems.

Magnussen et al. (2019) critically discussed path-dependent exercises and scripts. They provide critical insights on the utility of an exercise script in allocating and understanding tasks. Exercise planners can be caught by blind spots of the potential of locking in pride of profession, not exposing weaknesses and doubt to "competing emergency agencies" (Magnussen et al. 2019, p.170). Another blind spot may be created by the organizational culture and the routines in which exercises are planned. Finally, resources represent a powerful lock-in – a fear of not using resources in an accountable way. This emphasizes the need to support flexibility and trust in the planning processes.

Planning for debriefing and reflection

Debriefing and reflection exercises may potentially improve and develop people's capacity to respond to new and unexpected situations. Debriefing is an important process for analyzing, learning, and assessing the effectiveness of one's own experiences. Debriefings can be used to offer feedback

to participants to increase their self-awareness and offer them opportunities to learn from their experiences (Borodzicz and Van Haperen 2002). Kim (2014) investigated the design of disaster exercises and concluded that constant learning occurs, especially in discussion-based debriefs focusing on learning points from the exercise experience. Emergency preparedness exercises with an effective debrief may highlight coordination challenges within teams, organizations as well as cross-sectoral challenges.

Reflection is the most important tool for changing or improving emergency preparedness plans, procedures, and routines, identifying learning points throughout the whole process, and turning such experiences into common knowledge. Social constructivist perspectives in pedagogy focus on the value of discussions and learning through dialogue, shared reflections, and interpretations (Vygotsky 1978; Koschmann 1999). Reflection involves the exchange of both team and individual information to eliminate the creation of new or altering previous mental models.

Regarding emergency preparedness exercise planning, Andreassen et al. (2024) explained that debriefs and reflections may influence learning as these enhance cognitive motivation. A debrief of trainees' reactions and affection contributes to self-reaction processes and, consequently, to self-regulation as a source of motivation, which compare personal standards of taking an action (Bandura 2001). Reflection facilitates the configuration of mental models, allowing participants to compare their own abilities or develop their own personal standards of behavior in a given situation (Andreassen et al. 2024).

The importance of collective reflection in cumulative learning, collective decision-making, and collaboration has been emphasized in the literature (Berlin and Carlström 2015). Thus, planning collective reflection in collaboration exercises is significant. Moynihan (2009) highlights the effectiveness of conducting open-discussion forums close to the practical elements of the exercise. Often, debriefs after exercises are one-way communications in the form of brief summaries from coordinators of their perception of the exercises (Berlin and Carlström 2015).

Planning evaluation

To refine the collaboration, emergency response, and relevance of each exercise, it is important to indicate the shortcomings and highlight potential improvement areas (Donahue and Tuohy 2006). To evaluate the methodology of a collaborative exercise, it is important to identify measures for future modifications. This approach may be particularly useful because of the uniqueness and rarity of emergencies. The evaluation criteria may be as follows: the accomplishment of the objectives by the exercise; the need

for improvement in plans, procedures, or guidelines; the need for improvement in management system as a whole; training and staffing deficiencies; equipment needs; and the need for additional exercising (Fagel 2010, p. 280).

Evaluation may be flexibly structured; however, it is recommended that an evaluation model be used to capture important motivational factors that can couple reflection with feedback and enhance mental readiness to respond to crises (Andreassen et al. 2024). The dual process of "bottom-up" and "top-down" evaluation increases the sharing of knowledge, participants' understanding of their performance, instilling trust in the participants, and effectiveness of the evaluation (Faber et al. 2017; Molin et al. 2021). This is useful for planning, documentation, and reporting evaluations. Examining the perceived usefulness of evaluation descriptions Beerens et al. (2020) concluded that the objective of the evaluation, analysis, and conclusions should be clearly presented.

Model for collaboration exercise planning

Based on the above literature, we propose a model for a collaborative exercise planning process (Fig. 1).

When planning collaborative exercises, particularly in the context of emergency preparedness and crisis management or related fields, the steps that form the parameters of the exercise design must be thoroughly considered to ensure that the exercises are effective and educational. Exercise design refers to the strategies and frameworks used to create the exercise, ensuring it accommodates various learning preferences and backgrounds. We suggest exercise designing should be inclusive and flexible enough to allow collaborative participants from diverse disciplines and experience levels to contribute effectively and benefit from the exercise.

Accordingly, some essential steps (parameters) to consider for the proposed collaboration exercise planning model include (1) learning objectives, (2) scenario and exercise type, (3) identifying training audience, (4) plan for exercise execution, (5) plan for debriefing and reflection, (6) plan for evaluation, and (7) trust and communication.

Defining purpose and learning outcomes

These are clear and specific goals that outline the exercise's intended educational outcomes. They should articulate what participants are expected to know, understand, or be able to do by the end of the exercise. This parameter is important as learning outcomes provide direction for the exercise planning team to ensure that the next steps are relevant and that the participants' learning is focused. Therefore, well-defined collaborative intended learning outcomes ensure
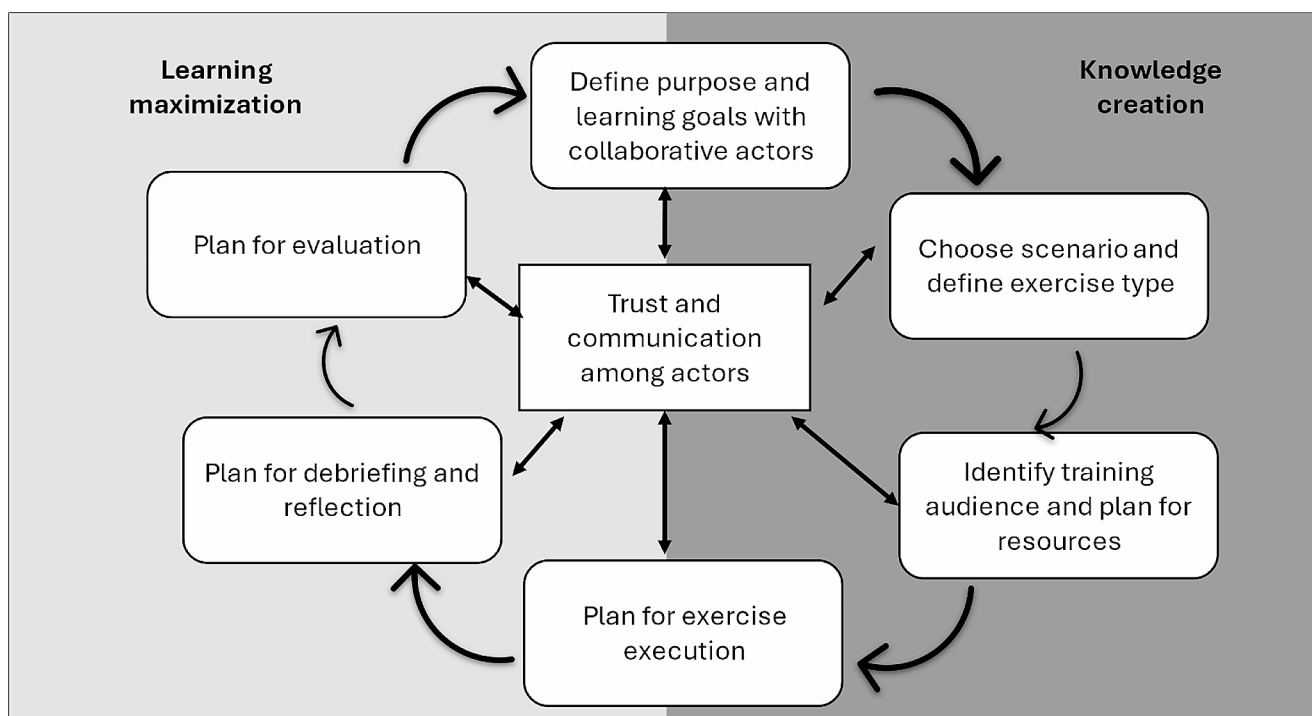
Fig. 1 Collaboration Exercise Planning Process

that the exercise remains relevant and targeted, facilitating the assessment of its success.

Choosing scenario and exercise type

This involves constructing realistic and engaging situations that require the participants to collaborate in order to solve problems that they might encounter in real-world emergencies. These scenarios help collaborative participants apply theoretical knowledge to achieve the intended learning outcome, thereby enhancing their problem-solving and decision-making skills.

Identifying training audience and resource planning

It is important to identify which participants are actually collaborating in the given scenario. Focusing on learning outcomes ensures that the choice accommodates the relevant set of learners. Thus, the involved actors' capacities must be clearly defined.

Planning for exercise execution

This refers to the main documents such as exercise directive, script, safety and security during exercise execution, observation and evaluation plan, responsibilities and tasks to participants based on their professional backgrounds and expertise. This step requires planning to ensure that

the exercise may be carried out effectively. These planning criteria cover the logistical, procedural, and operational aspects of the exercise.

Planning for debriefing and reflection

Planning for the debriefing and reflection step is structured according to learning outcomes and captures various learning preferences and backgrounds. The plan may provide a guide for a structured and effective debriefing session. This session is crucial as it allows the participants to reflect on their own performance, enhancing their learning and competence.

Planning for evaluation

This planning stage is to ensure an overall picture of the evaluation. This includes the evaluation goals in regards to learning outcomes, method for data collection, analysis strategy and reflection on the reliability of the method. The plan may define roles for evaluators that will apply their specialized knowledge effectively and understand their contributions of the overall exercise. An organized approach to evaluation ensures that the exercise provides actionable feedback for future improvements. It should be planned to understand the strengths and weaknesses of the participant performance.

Trust and communication

The trust criteria encompass the standards and practices necessary to build and maintain trust among the collaborative participants, facilitators, and stakeholders throughout the exercise planning processes. On the other hand, communication criteria refer to the standards and practices that ensure effective information exchange among participants, facilitators, and stakeholders involved in the exercise planning processes. Trust is required for effective collaboration, particularly in high-stakes environments such as emergency preparedness and crisis management. It ensures that participants feel confident in each other's abilities and intentions, which enhances teamwork and information sharing. Likewise, effective communication is crucial for coordination and decision-making in collaborative exercises. It ensures that information is accurately conveyed and understood, which is essential for achieving the planned exercise objectives.

The model demonstrates that these steps are interconnected. For instance, learning objectives influence scenario selection, which in turn affects exercise design. Participant roles are shaped by the scenario and design, and all parameters are evaluated to refine future exercises. Trust and communication reinforce each other. Effective communication builds trust, and a foundation of trust enhances communication. This dynamic relationship ensures that all other parameters function smoothly. Therefore, trust and communication are integral to every phase of the exercise planning. Such a relationship creates a continuous feedback loop, leading to ongoing improvement and refinement of the collaborative exercise planning.

Discussion

In today's complex and dynamic environments, knowledge creation and learning maximization among collaborative exercise participants is critical for ensuring effective emergency planning and preparedness. We discuss how our proposed collaborative exercise planning processes can enhance (1) knowledge creation and (2) the maximization of learning among collaborative participants through trust building and effective communication.

Enhancing knowledge creation and retention among collaborative participants

The proposed planning steps for collaborative emergency preparedness exercises can be employed as a model to enhance participants' knowledge creation and learning experiences by emphasizing the need for clarity and relevance of exercise learning objectives, appropriateness of choosing realistic and engaging scenarios, and the flexibility required with exercise designs and methodologies.

For instance, clearly defining learning objectives at the outset helps collaborative participants dialogue and understand the competencies and knowledge expected of them. Thus, a well-defined objective could help structure the exercise around key learning points, ensuring that participants progressively and systematically build on their diverse situational awareness skills and knowledge. This alignment is in line with the proposed focus on the usefulness of exercises (Carlström et al. 2019) and ensures that the exercises are relevant and directly linked to real-world scenarios to enhance knowledge creation and retention. Hence, we suggest that the selection of scenarios should closely mimic real-life situations that the collaborative actors can relate to so that the exercises will foster shared knowledge creation and learning processes. Active engagement in facilitated problem-solving with relevance to one's own profession or work fosters collaborative learning (Streichert et al. 2005). Thus, such contextual learning could help collaborative participants internalize lessons more effectively, as they learn to appreciate and anticipate the direct relevance of their actions and decisions on real-world outcomes. Thus, participants gain a better understanding of each other's organizations and trust when they align themselves with their professional language. It is assumed that such shared anticipation can influence participants' involvement, improve trust, and increase their motivation to learn and perform well.

Although our model suggests a systematic-oriented approach to collaborative exercise planning to foster knowledge creation and retention for participants, we are mindful of the need to be flexible regarding exercise designs and methodologies. This is crucial because different participants (with diverse backgrounds and interests) may have different learning preferences and strengths regarding the exercise design. Kayes et al. (2005) noted, learning opportunities arise in emergency preparedness exercises if participants are committed to joint reflections and dialogues. Therefore, to encourage active participation and deeper learning, it is necessary to employ diverse methods suited to different learning objectives. Therefore, flexibility ensures that the planned exercise scenario remains adaptive to the varied and evolving challenges that the participants may encounter, thus enhancing both the relevance and effectiveness of learning. This variability can foster new knowledge creation, creativity, and innovation, as collaborative participants must devise acceptable approaches to challenges that they might not have otherwise anticipated.

Maximizing learning among collaborative participants

Our proposed collaborative exercise-planning process also provides a critical avenue for maximizing learning and enhancing participants' collective decision-making capabilities. Additionally, it serves as an essential mechanism for building participants' communication and trust. Thus, focusing on the planning process phases can create a framework that facilitates learning and fosters a collaborative spirit.

Previous literature contends that collaborative participants need to use their prior experiences to create new knowledge (Berlin and Carlström 2015; Torgersen & Sæverot, 2015; Badu 2023). In the initial stages, knowledge may be created by defining collaborative exercise-based learning goals. Selecting a scenario that mimics shared real-life situations is important for maximizing learning. Therefore, we propose that the focus should be on the processes involved in the key elements of effective communication and trust building among all the actors involved. These elements are influential during the subsequent planning phases such as exercise execution, debriefing, and evaluation.

At the plan for exercise execution phase, effective communication strategies ensure that all the participants are clear about their objectives, roles, and expectations. Similar to Roud and Gausdal (2019) and Seppänen et al. (2013), the trust created is tested here, as participants must rely on the information provided and the framework laid out for the exercise. Thus, a transparent and inclusive planning approach encourages trust and fosters a collaborative environment in which knowledge is valued and freely shared. Following the plan for exercise execution, the plan for debriefing and reflection phase provides a critical opportunity for collaborative participants to communicate their experiences, challenges, and strengths. In line with Koschmann's (1999) explanation, dialogical and reflective practices emerge significant in the participants' learning. This phase is vital for consolidating and maximizing learning and reinforcing trust among collaborative participants. As Badu et al. (2023) suggest, effective on-site communication and trust strategies may help overcome the challenges of undertaking collective action. We propose planning for a debriefing environment that fosters open dialogue among participants and is characterized by a welcoming and respectful atmosphere. This ensures that all participants feel safe and are encouraged to express their thoughts, ask questions, share ideas, acquire knowledge, and provide constructive feedback. Planning for open and honest discussions during debriefings can provide deep insights to our understanding of the collaborative environment, which is essential for collective learning and improvement. Further, participants need to learn about each other's strengths and weaknesses to build trust. We also propose that flexible approaches be considered during planned debriefing activities to obtain relevant and timely feedback. This is vital because debriefing helps recognize and acknowledge each participant's contributions, which in turn improves trust and team dynamics.

The planning for evaluation phase closes the loop of the proposed collaborative exercise-planning process and serves as a key component for continuous improvement. As proposed by Andreassen et al. (2024), planning for evaluation may be an essential step in maximizing learning among collaborative exercise participants. Based on our model discussion, feedback mechanisms must be clear, constructive, and actionable as communication plays a significant role in the evaluation step of the model. Trust is reinforced when participants witness the seriousness shown towards their feedback and its contribution to tangible improvements. Transparent evaluations that incorporate diverse perspectives not only enhance the process credibility but also ensure that the decisions are made on a well-informed basis, leveraging the collective knowledge and experience of collaborative participants.

Thus, by embedding effective communication and trust-building strategies into these phases, the planning process becomes more than just a procedural activity; it transforms into a dynamic interaction space in which shared knowledge is created and optimized to inform emergency preparedness decision-making.

Limitations of the study

While our conceptual model offers a structured approach to planning collaborative exercises, it has several limitations. The model has been tested in practice, but documented empirical research studies may help to assess its effectiveness across different emergency contexts. Future research should focus on validating the model through practical applications and addressing any identified gaps or limitations.

Conclusion

In this conceptual paper, we presented detailed steps required to plan collaboration exercises. A model guiding these planning steps was proposed to enrich learning and enhance collaboration, communication, and trust.

To foster effective collaboration, for planning collaborative elements or tasks regarding resource scarcity in an exercise scenario, the collaborative purpose must be encouraged and clearly defined. In some types of exercise, a script enhances the collaboration of the involved actors in the planning and preparation phases. A script should be

planned in such a way that it addresses collaboration problems to embrace more resilience for unwanted incidents but should not create dependency. Furthermore, it is important to collectively reflect, debrief and evaluate to enhance learning and provide systematic organizational evaluation and reporting. This study contributes to the literature on emergency preparedness exercises by focusing on the planning processes. To maximize learning and enhance collaboration, communication, trust amongst the actors involved, learning outcomes, and content along with methods are planned before an exercise.

Significance of the study

Our study provides a structured approach to planning collaborative exercises, enhancing the competencies of emergency preparedness organizations. Our model promotes effective collaboration and knowledge-sharing by integrating trust-building and communication strategies. This can lead to improved decision-making and response capabilities during emergencies.

This study's planning model provides practical implications that can be used to develop effective collaborative exercises on emergency preparedness. The model guides planners through essential steps and elements by emphasizing their knowledge and collaborative competencies. Additionally, it highlights the need for more impactful exercises to enhance collaboration, communication, and trust within organizations. Organizations can leverage this planning model to create purposeful collaborative exercises on emergency preparedness that enhance competence, foster communication, and build trust among team members.

Practical testing is essential to validate the model's effectiveness. Future research could engage in action research by applying the model to the planning exercises of emergency preparedness organizations. A future research area could involve conducting empirical studies to examine how different elements are incorporated into emergency preparedness exercises in various sectors. Reflecting on the outcomes of the collaborative exercises will lead to refined recommendations for future emergency preparedness exercise plans.

Declarations

Ethical approval Not applicable.

Competing interests The authors declare no competing interests.

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