



Learning in a State of Inadequacy: Simulations of Extreme Events as Preparation for Crisis

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Abstract

This article investigates how participants in simulations of extreme events handle *inadequacy*, contributing to the discussion on workplace learning in high-pressure and unpredictable scenarios. The study is based on ethnographic fieldwork conducted across five simulations in three organizations (military, police, and county administrative board), involving 288 h of observations, ethnographic interviews, and 18 semi-structured interviews. The analysis focused on identifying episodes where participants encountered inadequacy, exploring how they recognized, attributed, and addressed it. Our findings reveal that inadequacy disrupts routine practices but also fosters opportunities for learning and innovation. Key conditions for effectively handling inadequacy include the voicing of inadequacy, which requires psychologically safe environments, and proactive responses such as improvisation or acceptance under urgency. Additionally, simulations, while controlled and artificial, effectively expose inadequacies, revealing gaps in preparedness that can inform future crisis responses. This article contributes to professional learning by highlighting inadequacy as a critical factor in both individual and collective learning, offering insights into how simulations can be designed to enhance preparedness for unpredictable, high-stakes events.

Keywords Inadequacy · Simulation · Professional learning · Practice theory · Extreme contexts

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Introduction

This article is an exploration of the concept of “inadequacy” and how it can extend scholarly discussion of how practitioners and learn from, and prepare for, unexpected and extreme events. While professionals devote significant efforts to preventing crises, once these events unfold, established knowledge and competence often prove insufficient. In such situations, actors are required to navigate uncertainty, improvise, and adapt (Bechky & Okhuysen, 2011; Fraher et al., 2017; Klein et al., 2006; Leuridan & Demil, 2022). Although inadequacy is a common experience in workplaces, it is often framed as an individual issue, neglecting its broader social and contextual dimensions. This article seeks to address this shortcoming by examining inadequacy as a social construct that arises through activity in specific contexts, and thus as a collective practice-oriented issue. Drawing on practice theory, we explore how inadequacy is experienced and worked with during crisis situations, with a focus on how individuals and organizations learn to adapt in these kinds of “disorienting dilemmas” (Vaughan et al., 2014). Through this lens, we aim to shed light on the critical role inadequacy plays in preparedness, revealing its potential to both hinder and drive learning in practice.

Extreme events, defined as “a discrete episode or occurrence that may result in an extensive and intolerable magnitude of physical, psychological, or material consequences to—or in close physical or psycho-social proximity to—organization members.” (Hannah et al., 2009, p. 898), are stressful and demanding to organizations. To increase preparedness for these events, crisis management organizations engage in scenario- and simulation training, where the organization’s response is simulated in relation to an imagined event (e.g. Waller, 1999; Carroll et al., 2006). Much of the literature on crisis management training point to the problem of coping with the unexpected and unpredicted; in other words, “being prepared for being unprepared”. While we know quite a lot about how simulation facilitates learning and prepares for performance in real situations, we do not yet know how simulations can prepare for the unexpected.

The concept of inadequacy is well explored in psychology (e.g., Boduszek & Debowska, 2020), taking the starting point in the individual and individuals’ feelings. In that literature, inadequacy is closely related to concept of self-esteem and “imposter syndrome” (Holmes et al., 1993). Similarly, in the literature on resilience training, recovering from adversity is explored as an individual capacity (Hartmann et al., 2020). Thus, viewing inadequacy as a social construct, particularly one that emerges through context and activity, is relatively underexplored. This perspective is important because the world—and by extension, organizational life—is inherently imperfect and inconsistent. As a result, people in organizations must confront inadequacy regularly. However, we know little about how this process unfolds, as the individual-oriented view of inadequacy fails to fully capture its situated meaning and impact within specific contexts.

We depart from a practice theory perspective on simulation (Hopwood et al., 2016), and practices (Schatzki, 2005) with the purpose to explore the experience and handling of inadequacy in simulations. Using an ethnographic approach, we have observed simulations of extreme events in three organizations. The article answers

the following research question: How do participants in a simulation learn in a state of inadequacy?

In the article, we use observed episodes of inadequacy to construct a process model of how inadequacy is experienced and subsequently worked with in these simulations. Theoretically, we contribute with a practice theory framework to understand inadequacy as a feature of workplace learning. We also suggest important points of consideration for practitioners seeking to enhance simulation training for the extreme and unexpected.

Inadequacy and Learning for Preparedness

Inadequacy is a central challenge in preparing and training, as both organizations and individuals often find themselves facing situations where established routines and practices fall short. While much research has explored how learning occurs through everyday practices (Fenwick, 2008; Lindberg et al., 2024), crises expose the limitations of these approaches. This section examines how inadequacy plays a crucial role in shaping preparedness for extreme contexts, where traditional learning and adaptation are insufficient, and organizations must confront the gaps in their practices and systems when routine processes break down.

Learning Preparedness in Extreme Contexts

In crisis management organizations, significant efforts are devoted to preventing extreme events from manifesting. High Reliability Organizations (HRO's) are partly defined by their "preoccupation with error" (Weick & Sutcliffe, 2001; Fraher et al., 2017). Existing routines and processes are, however, often inadequate once the situation unfolds. Instead, organizational members must act in a state of confusion and bewilderment, for instance by improvisation (Bechky & Okhuysen, 2011), dynamic delegation (Klein et al., 2006), or developing "slack" (Leuridan & Demil, 2022). In the field of crisis management, much attention has been given to how resilience training can improve workplaces and individuals' recovery from adversity (Hartmann et al., 2020; Robertson et al., 2015).

There are, however, mixed perceptions in the literature on whether training for extreme events is at all beneficial. Nilsson and Eriksson (2008) show that individuals involved in crisis preparedness training often struggle to transfer lessons learned to their organizations. Similarly, Heino et al. (2021) suggest that we tend to overestimate what we learn from past crises, which can result in worse preparedness for future, unexpected crises. They argue that training does not necessarily improve an organization's crisis-handling capabilities. On the other hand, previous research suggests how to mobilize extreme events in learning, and that sociality and reflection are promising ways forward. Veestraeten et al. (2014), in their study of military training, emphasize that training is an inherently social phenomenon, underscoring the importance of the training environment. Similarly, Vaughan et al. (2014) emphasize the sociality of participants in learning environment as a key factor in overcoming adversity. Finally, Hällgren & Buchanan (2024) finds that scenario training can prepare participants for

future unexpected events by making them comfortable with uncertainty and by challenging their assumptions. Therefore, disorienting dilemmas, while challenging, can catalyse deeper learning and improvement in professional practices.

Conceptualizing Inadequacy

The term “inadequacy” is rich in its linguistic roots and history, providing insight into how its meaning has evolved over time (Oxford Advanced Learner’s Dictionary, 2024). “Inadequacy” originates from combining the prefix “in-“, meaning “not,” with “adequacy,” which derives from the Latin “adæquātus.” The term “adæquātus” itself comes from “adæquare,” meaning “to make equal to,” from “ad-” (to) and “æquare” (to make equal), from “æquus” (equal, level, calm, fair). Thus, “inadequacy” literally translates to “not equal to” or “not sufficient.” It emerged in the language to describe something lacking the quality or quantity required; insufficient for a purpose. Over time, its application can be said to have evolved from not just describing insufficiency in quantitative terms but also to qualitative assessments in various contexts, such as personal skills, resources, and organizational capacities. We can thus view inadequacy at several levels:

At the *individual level*, we can understand inadequacy as the gap between an employee’s capabilities and the demands of their role. This gap can stem from a lack of skills, knowledge, motivation, or resources needed to perform their job effectively. However, it is also essential to consider the psychological impact of perceived inadequacy, including lowered self-esteem and decreased motivation (Boduszek & Debowska, 2020), which can further hinder performance. Individual inadequacy can thus be understood as a lack of competence – that is, that the individual’s competence is inadequate in the face of a certain situation or task (Morris et al., 2015). Previous studies of extreme contexts, such as US navy seal training, have also resorted to individual’s dealing with breakdowns as learning to “embrace the suck” (Fraher et al., 2017). The literature on resilience training also offers a largely individual perspective on how to tackle uncertainty and adversity (Hartmann et al., 2020; Robertson et al., 2015).

At the *collective level* inadequacy may be understood as the ways in which the structures, policies, and cultures of an organization may not support or may even hinder the achievement of its goals. This can include unclear communication channels, inefficient processes, misalignment between individual roles and organizational objectives, and a culture that does not foster innovation or employee engagement. Weick (1995) has particularly been interested in situations of organizational breakdowns in extreme events, leading to misunderstandings, misalignments, and sometimes catastrophic failures. In his various writings, including analyses of organizational disasters like the Mann Gulch fire (Weick, 1993) and (more recently) the *El Faro* disaster (Weick, 2022), Weick often points out that these breakdowns are not only about the failure to notice or understand but also about the failure to act appropriately based on that understanding. Woods (2024) conceptualize a command-adapt paradox to account for organizational failures to respond to crisis. The paradox arises from the simultaneous need to plan ahead (command) and to improvise in the face of rapid changes (adapt).

Finally, *systemic inadequacy* goes beyond the confines of a single organization, referring to the broader ecosystem in which organizations operate. This can involve regulatory environments, industry standards, or market conditions that create challenges for organizations. Understanding inadequacy in this manner requires a system thinking (Monat & Gannon, 2015), which views an organization as a complex system composed of interrelated and interdependent elements. Failures are often not the result of a single cause but emerge from the interactions within the system. Organizations can be seen as complex adaptive systems that are dynamic and sensitive to initial conditions. Complexity theory (Ahern et al., 2014) helps to understand how organizational behaviour emerges from the interactions of multiple agents (including employees, management, and stakeholders) and is influenced by feedback loops, adaptation, and evolution.

Inadequacy from a Practice Theory Perspective

The definition of practices puts human activity – defined as a practical capacity to ‘go on’ – at the centre of how practices develop. Indeed, practice theory emphasises practical dealings, or participation in practice (rather than cognition or reflection) as the central and primary vehicle by which people engage with the world and by which social structures are produced (Feldman & Orlikowski, 2011).

As put forth by Schatzki (2017, p. 28), from this priority of action before “accompanying acts of cognition” it also follows that activity is embodied, tacit and many times unreflective as actors are embedded and immersed in practice (Sandberg & Tsoukas, 2020). Sandberg and Tsoukas (2020) describe this in terms of “absorbed coping” which denotes the primary way actors in practices are engaging with the world in a direct and instant way. This absorbed coping is related to what Schatzki call ‘Practical intelligibility’. Practical intelligibility is a central concept in a Schatzkian understanding of practices as “ongoing” activity. In his framework (Schatzki, 2005), practical intelligibility refers to the way actions become understandable and meaningful within the context of a given practice. Actions are intelligible not primarily because they are the outcome of reflective decision-making, but because they fit within a web of practices in which the actor is already engaged (Caldwell, 2012). This web consists of interconnected activities, understandings, rules, and teleoaffective structures (aims and emotions) that give coherence to the practice. Similarly, Feldman et al. (2016) describe patterning as a way to explain how practices (and routines) are ongoing effortful accomplishments. Patterning refers to the processes through which the patterns of action that constitute routines are formed, maintained, and transformed. This concept emphasizes the active role that individuals play in shaping routines, highlighting how patterns of action are both constraining and enabled by previous actions.

These ideas about the ways practitioners engage in practice through a state of ‘being-in-the-world’ is important as it sheds light on how the phenomenon of inadequacy can be understood from a practice theory perspective. In essence, the state of inadequacy becomes absurd if a baseline criterion for participation in practice is that such engagement presupposes an ability to “go on” in a flow of activity. In contrast to this, inadequate practicing presupposes disconnection, detachment, deterioration

and alienation from participation and social patterns. A practitioner that experience inadequacy enters a role of ‘outsider-within’, where one is still participating in practice, but doing this from a detached position. In other words, the situation will be characterized by abstract detachment (Sandberg & Tsoukas, 2020).

Thus, inadequacy may be a clue to understand how new understandings can form in a practice. In dealing with situations involving the unexpected, practice theory has leaned towards emergence as a concept (Hager, 2012; Hopwood et al., 2016). It involves understanding how practices — routine actions or patterns of behaviour that are socially recognized within specific contexts — can give rise to new social phenomena, structures, or patterns that are not necessarily predictable from or reducible to individual actions alone. In this view, emergence reflects how complex systems (such as social practices) can produce outcomes and structures through the interactions of their constituent parts. However, how safe positions of “being-in-the-world” and engaged within practices give rise to new phenomena is less understood. Here, we need to give further attention to situations where practices break down and existing ways of doing things are insufficient in handling the situation at hand. Extreme contexts are also practices where time and space have a particular impact (Schatzki, 2010). Often, extreme events require urgent action to avoid further loss. Urgency can be understood as “subjective and objective time pressure, in which delays for action will lead to increased risk or harm” (Orlove et al., 2024, p. 272). Feeling urgency is conceptualized as a sense of time pressure and something that is based in a subjective perception and thus experienced very differently for different actors (Anderson, 2017; Bechky & Okhuysen, 2011).

Practice theory also offers a different take on simulation as a learning environment, in that simulations should not be conflated with imitations of “real” practice. Instead, simulations represent their own site of practice with distinct social and material dimensions and logic. Simulations may draw on other practices, creating connections or “bundling” with them in various ways (Caldwell, 2012). In this article, we conceptualize simulations as sites of practices in their own right. This shifts the analytical focus to the “practices of simulating”—how participants engage with unfolding events by drawing on previous experiences, interacting with each other, and making sense of the situation, thus continuously constructing the practice of simulation (Hopwood et al., 2016). This approach allows for the analysis of simulations as practices that are informed by, and interconnected with, other crisis management practices. Research from this practice-theory perspective has highlighted the complex interactions between teachers, students, and material arrangements during simulations (Ahn & Nyström, 2023).

Methods

To explore how inadequacy is addressed in simulations of extreme events, we conducted ethnographic fieldwork across five simulations within three distinct organizations: the armed forces, the police, and the county administrative board. Choosing these organizations provided ample opportunities of cross case comparisons, as they rely on the same mode of command. Each simulation unfolded over 2–5 days and

were observed by two researchers simultaneously. A total of approximately 288 h of observational data was collected. We continuously conducted ethnographic interviews in addition to 18 semi-structured interviews (on average about 60 min) and documents from the organizations to supplement the data. The ethnographic interviews were particularly helpful to offer us understandings on why the participants struggled with certain tasks. Here, the instructors informed us on why they had set up the exercises the way they had, and what insights they wished the participants to take home. In addition, and most importantly, interviews provided explanations for what was *not* said and what was not evident from observation alone. Participants entrusted us with explanations for being silent or motivations for acting the way they did. Particularly in the county administrative board, where several participants were participating digitally, the interviews were instrumental in making sense of what took place during the exercises. Table 1 illustrates the fundamental layout of the observed exercises.

Research Context and Data Collection

Extreme contexts are known for providing access to “hard-to-get-at organizational phenomena” (Hällgren et al., 2018, p. 112), all the while they may be difficult to study for ethical or safety reasons. That is also why inadequacies are important to investigate through simulations. Simulations involving police, military and county administrative board provided a rare opportunity to increase the understanding of inadequacy by virtue of the rich condensation and concentration of social action. Therefore, the three cases are prime simulated examples of testing risky procedures without people getting injured.

All simulations followed the same basic template of the incident command, closely resembling the layout of the incident command structure as outlined by Bigley and Roberts (2001). According to this structure, an incident commander is appointed to handle the situation, supported by a command crew with designated tasks such as personnel, intelligence, situational report, communication, etc. The work is coordinated and led by an incident command manager. During the sessions, two of the authors were present simultaneously, taking notes using pen and paper, computers, or tablets. We also recorded conversations when deemed appropriate. We used a shared Nvivo 12 project to organize the data.

The Military Case

In the military case, we observed a five-day simulation exercise that replicated an invasion of the Swedish mainland. This training took place twice, with two observers present during each session. The training unit, consisting of about seven instructors, operated from a garrison in a small Swedish town, using dedicated facilities. Advanced simulation software allowed them to create a detailed war game, simulating both friendly and enemy forces, complete with realistic terrain maps. Participants used radios and field equipment designed to mimic what they would use in real operations. A mobile command post was also recreated using mock-ups of terrain vehicles fitted with radios and other appropriate equipment. During the exercise, participants

Table 1 Overview of the studied cases

	Military	Police	County administrative board
The exercise - task	Invasion of the Swedish mainland - defend	Terrorism and abduction – find the assailant	Nuclear disaster – organize clean-up of contaminated snow
The premises	Designated building	University building	The workplace conference room
Material	Advanced simulation software, mock-ups, real equipment	Computers and smaller rooms, whiteboards, some simulation equipment (doll, car, explosion)	Conference room equipment, radios, geographical software (GIS)
Staff	5–7 instructors	3–4 instructors	3–4 instructors
Participants	Battalion leadership and staff (~15 participants) x 2	A group of experienced homicide investigators (16 participants x 2)	A wide range of agencies from municipalities to the police and military (~50 participants)
Data collected	Observations of two five-day sessions, two observers (Author1, A2, A3). (Total of ~160 h) Ethnographic interviews Four recorded semi-structured interviews.	Observations of two three-day sessions, two observers (A1, A2). (Total of ~80 h). Ethnographic interviews Interviews and discussions with instructors on four occasions.	Observations of one three-day session, two observers (A1, A2). (Total of ~48 h) Ethnographic interviews 14 recorded semi-structured interviews

were given specific objectives and tasked with leading the transport to a simulated conflict zone and managing battlefield operations, while the instructors assumed the role of the opposing force. To complement our observations, we also conducted four semi-structured interviews with both participants and instructors.

The Police Case

The police scenario involved an exercise where participants were challenged to locate a suspect who had kidnapped a journalist and later detonated a car with a person inside. The crime evolved from abduction into a simulated terrorist incident, requiring participants to lead the investigation and manhunt based on evolving information from the instructors. We observed two separate sessions, each lasting two days, with two observers present for each exercise. The training team consisted of 3–4 instruc-

tors and an incident command group of five, who acted as operational leaders. The exercise took place in a university building used for police training. Some physical equipment, including a car, a mannequin, and a simulated bomb, was used in the scenario, but most of the exercise was conducted with the help of whiteboards and computers. Communication between participants and instructors was facilitated by sharing digital files.

The County Administrative Board Case

The county administrative board case involved a large-scale coordination exercise that brought together a variety of organisations, including municipalities, the media, the military, police, hospitals, and others. The board's primary responsibility was to coordinate responses, and participants were tasked with managing the clean-up efforts after a fictional nuclear power plant explosion had caused radioactive fallout and significant contamination from snow in northern Sweden. We observed the incident command team working from a conference room at the board's premises, while other organisations communicated via radio and an online platform. Instructors used interactive geographic information system (GIS) software to manage the clean-up operations. While the instructors had a key role in planning the exercise, they largely remained passive during its execution. The number of individuals in the incident command post ranged from 10 to 20 over the course of the exercise, and over 50 participants from various organisations were involved in total. Access to a second planned exercise at the county administrative board was denied due to confidentiality concerns. To make up for this, we conducted 13 recorded interviews focused on incident command procedures at the county administrative board. Recorded interviews were transcribed verbatim and added to the dataset.

Analysis

In our analysis, the comparative approach has proven particularly helpful in discerning organization-specific situatedness and general constituents of crisis management work that extend beyond organizational borders. The use of multiple observers during the simulations also provided triangulated perspectives on the same events. The analysis was conducted abductively, involving iterative movement between empirically grounded categorizations and theoretical concepts (Srivastava & Hopwood, 2009). The abductive nature of analysis can, in overview, be described as follows. We conducted the empirical investigation and noted a couple of situations that were particularly interesting and for which we did not have a clear explanation. We then moved to reading and discussing "inadequacy" as a possible concept to explore, and we did readings in practice theory and conceptualizations on what was entailed in the term inadequacy. After this, we revised the whole dataset and did the present analysis in three consecutive stages, described in the following:

In a first sorting of the data, we extracted passages where we participants experienced discomfort with the situation at hand, what we have interpreted as (different) states of inadequacy. In this stage, we made a wide inclusion of passages, ranging from mild frustration or perplexity to serious distress and conflict. We thus included

all episodes where participants expressed, for instance, shortcomings, frustration, or bewilderment. Here, we employed principles from thematic analysis (Braun & Clarke, 2006, 2021) in constructing themes of what participants did, how they expressed confusion or bewilderment, and any reports collected through ethnographic interviews that pertained to the situations we had observed. In this phase, each instance in which participants experienced or displayed signs of inadequacy was systematically identified. Coding included both manifest content (e.g., verbal expressions like “I don’t know what to do”) and latent content (e.g., hesitation before deciding, obvious confusion, or seeking information on how to proceed). The coding was data-driven, allowing patterns of inadequacy to emerge inductively.

After the initial coding, the focus shifted toward identifying broader themes by grouping related codes. Themes represented significant patterns or meanings related to participants’ feelings of inadequacy in crisis situations. In this second stage of analysis, we used a theoretical frame of practice theory to explore inadequacy. This includes analysis of how inadequacy is expressed in talk as well as in observed activity (Schatzki, 2010). We used two broad theoretical frames (‘experience of’ and ‘working with’) in the findings. Here, the analysis departed from a view that inadequacy is experienced and concurrently worked with in diverse ways.

Finally, we compiled 10 critical episodes from the simulations, where we saw either manifest or latent signs of inadequacy. Here we employed concepts from *process tracing* as an analytical tool (Bennett & Checkel, 2015), particularly the concepts of casual mechanism analysis and theory-testing. Using the codes from the previous step, we compiled a process model (Fig. 1 in the findings). The final model of the

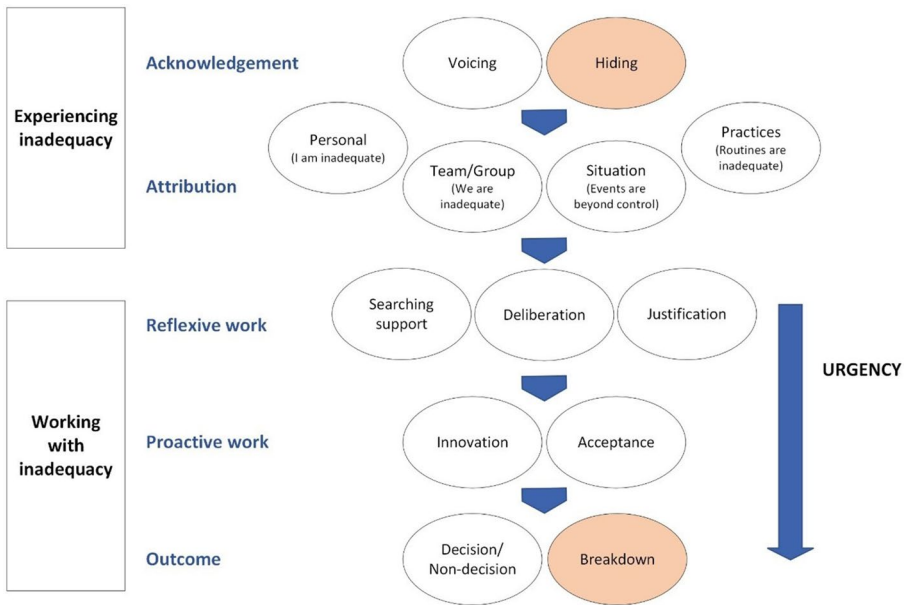


Fig. 1 The process of handling inadequacy in simulations of extreme events

handling of inadequacy compiles the thematic analysis and process tracing steps and describe the experience of and work with inadequacy in these three organisations.

Findings

Table 2 shows an overview of the 10 episodes we used for process tracing in our analysis. These extracted episodes differed greatly in both prerequisites, process, and outcome, and thus we were able to iterate between describing the process and compiling and finalizing the themes that are used to distinguish between steps in the process.

In the following, we present the themes that were constructed in the thematic analysis. We then go on to describe what we interpret as adverse outcomes of handling inadequacy, and, finally, arrive at a theoretical process model to describe handling of inadequacy in these organizations. In the following, quotes from interviews are verbatim quotes, while extracts from observation notes are approximations of what was said, unless they are given in quotation marks. These were extracts of conversations that we were able to capture just as they were said.

Experiencing Inadequacy

As we conceptualize it, the state of inadequacy is a form of being “thrown out” of an otherwise normal ongoing flow of activity. The state contains two main aspects that have implications for working from an experience of inadequacy. Those are whether inadequacy is *acknowledged* and where inadequacy is *attributed*.

Acknowledgements

Acknowledgement of inadequacy concerns whether participants voice inadequacy or not. The *voicing* of inadequacy means open recognition of shortcomings. As an example, the commander in one of the battalions voiced inadequacy in the following manner:

”Help me! I’m inexperienced. Take the initiative based on your functions and skills.” She also says that they shouldn’t keep it inside if they have something to say, they should tell her. “Don’t wait for me to give you the correct information”. (Episode 1, Observation notes, military).

Other times, inadequacy is *hidden*, that is the acknowledgement is silent and not openly voiced. As an example, a group of communicators in the county administrative board received information that people started organizing cleanup of contaminated snow themselves. The communicators were at loss on how to proceed. While they perceived this scenario as interesting and realistic, putting pressure on the command, they hid this complication from the rest of the functions.

Communicator: We are getting reports from [town X] that civilians are taking their tractors out and start to push snow around. What shall we do?

Table 2 10 Episodes of observed inadequacy used for process tracing

Episode	Nature of inadequacy	Observed handling of inadequacy	Outcome
Military			
1. First meeting planning standing by the map	Lack of procedural knowledge, lack of familiarity with routines, leader feeling bewildered	“Help me”, collaborative effort to help getting back on track	Failure to deliver orders in appropriate manner, rewinding of exercise
2. Identifying point of decision through acting out scenarios	Lack of knowledge, failure to identify alternatives	Seeking support, consulting manual, guidance by instructor	No real help from scenarios in guiding actions
3. Battalion leader inactive/sidestepped	New organization of leadership not suitable	Trying to find ways forward, culminating in dismissal of new organization	Conflict, discussion, issue unresolved when simulation ended
4. Command vehicle taken out by bomb	Lack of communication, not knowing how to transfer command to other function	Leading from unsuitable position, finally managing to transfer command	Ability to function as a unit eventually restored
Police			
5. Car bomb exploding “live” in the simulation	Stress, inability to contain and control	Bewilderment, seeking affirmation, relying on (ineffective) prior knowledge	Breakdown (conflict and failure to proceed with investigation)
6. Perpetrator sending out threats to newspapers	Falling behind, having to move on without sorting out “old” information	Feeling powerless, seeking affirmation, voice frustration	Moving on with added information, leaving old unsolved issues
7. Surveillance officer identified a potential witness	Lack of trust in other functions holding interrogation, lack of time	Weighing alternatives, discussion	Leaving interrogation to patrol officers
County Administrative Board			
8. Reports of citizens shovelling snow with own tractors	Lack of mandate, lack of collaboration	Hiding inadequacy, not passing on information	Failure to address issue, learning lost to other actors
9. Decoding situational reports	Several actors, inability to sort between new and old information	Using an old colour scheme and reinventing it to suit current situation	Successfully moving on in the exercise
10. GIS-map not working for participants	Time issue, stalling simulation, actors unable to contribute	Getting out recommendations for web browser, hands-on helping	Workarounds, central command assuming work from actors

Instructor: Oh. That’s not good. (Episode 8, Observation notes, county administrative board)

Attribution

Another important finding concerns how participants attribute inadequacy. Here, we also noted how different attributions impact the handling of said inadequacy in our process tracing analysis. The acknowledging and handling of inadequacy is inher-

ently different if it is attributed to me as a person, to the people in the group, to the organizational routines that are supposed to guide the handling of a situation, or to the organization in relation to the event/scenario itself. In addition, different attributions not only lead to diverse ways of handling situations, but also that attributions can differ even though the situations are similar.

A *personal* attribution means that inadequacy is perceived as laying with oneself. Usually understood as lack of competence, experience, or knowledge. Importantly, inadequacy that arise from lack of information, however, rarely led to a personal attribution. Inadequacy could also be attributed to the team or the group with which they are working. In one episode in the police case, frustration with the group's performance was evident:

'We have too few staff, we are too far behind.' There is an investigator in a green shirt who is leading here and arguing a lot that we need to be faster, we need to 'get to them quicker.' (Episode 6, Observation notes, Police).

In other episodes, we interpreted that inadequacy is attributed to the *practices*, usually conceptualized as the organizational routines that are supposed to guide handling of crisis. This could concern for instance mandate as well as how, where, and to whom, situational reports are administered. Finally, we saw cases of attributing inadequacy to the *situation* itself. This contains cases where for instance the outcome was negative (e.g. the death of the kidnap victim) but the group felt that the organizational capacity to prevent this outcome was not sufficient. In other words, they felt that they did everything right but how the situation unfolded made a positive outcome unattainable.

Working with Inadequacy

The next step of the process concerns how participants worked with (or did not work with) inadequacy. Here, we constructed two main themes, understood as two main types of work that participants engage in to handle inadequacy: Reflexive and proactive work.

Reflexive Work

Reflexive (backward looking) work means that participants in various ways tries to find knowledge, experience, or guidance in difficult situations through working alone or with others. *Searching support* includes both trying to find support in existing routines as well as in other participants (social support). Support in existing routines often comes down to consulting "the handbook" of incident command work, while social support often is manifested by asking for opinions or previous experiences of other participants. *Deliberation* includes a process of weighing alternative actions. Deliberation is often concerned with choosing the lesser of two evils and is a more reflective stance than muddling through. This is particularly prominent in situations where inadequacy arises from lack of information, in combination with that the decision taken can have severe consequences:

They discuss what should have been done. Should you have put surveillance on Allan instead and discuss the difficulties of it, are all undercover officers comfortable with that? There is a threat, and he can be armed, and it may be Allan who is the perpetrator. Then they ask if everyone would think it was okay to put a surveillance officer on him, and the reactions are mixed. Not everyone thinks that's okay. (Episode 5, Observation notes, Police)

Finally, *justification* concerns the means taken to assure oneself or one's team that "we did all we could". The following reasoning occurred when one of the fictive persons in the police scenario became victim of a car bomb:

In the best of worlds, we should have been able to prevent Allan from being blown up. The focus here is that it is more important to stop the perpetrator. The perspective of saving lives is more important than the long-term investigative perspective regarding methods on-site, as well as the risk of destroying evidence. As an immediate measure, we secured Allan and his family. Personal protection and taking him in for questioning. We are confident that we did this; someone in our function would have picked him up. (Episode 5, Observations notes, Police)

Proactive Work

Proactive (forward looking) is something the scenario pushes participants to engage in. As mentioned, we interpret this as a dynamic that arise as urgency in these kinds of events. Often, the existing routines are not adequate for the events at hand, which sometimes leads participants towards *innovation*. This includes novel places and spaces for working, as well as new routines, like when the county administrative board made a simple colour scheme to decode situational reports:

It was correctly understood that the yellow highlighted is 'new' and the green is things that are unclear or need to be checked. 'It's a carryover from the COVID period,' says Jenny. Back then, we used yellow for what was new, green for what we needed to pay extra attention to, and yellow crossed out for what we thought we could remove. (Episode 9, Observation notes, County Administrative Board).

Acceptance, which bears resemblance with "embracing the suck" (Fraher et al., 2017) refers to a common strategy of the participants, where they simply cope with inadequacy – there is too little time, too much conflicting information, and what we do just have to be "good enough".

And then [the instructor] is clear that you should not be wondering what to do, but instead, a decision needs to be made, and here are the alternatives. Once you've done your part, you should let it go. Now, this hasn't happened, he says, so a new card comes from the intelligence officer. We get an attack here, it's a likely spot. What do we do if we get an attack with the group size

they are suggesting? And they conclude that maybe we don't need to do much; we need to wait for reports. And [the instructor] steps in and says that, well, then you should let it go. When you've done your job, the instructors are constantly emphasizing, you need to move on, you can't get stuck somewhere, and it requires immense experience and intuition to feel that this is something we can pass on up or down and trust that those below are doing what they should and that all other parts are doing what they should. (Episode 2, Observation notes, military)

Adverse Outcomes

Two outcomes of the process can be shown, in our material, to have adverse effects on participants as well as outcomes. The first concerns where inadequacy is not openly acknowledged – *hiding*. While hiding is inherently difficult to observe, we sometimes had the opportunity to listen in on conversations where participants admitted to hiding. Other times, we saw evidence of hiding in subsequent interviewing of participants. In an episode concerning a conflict in the County Administrative Board, a participant noted that there had not been honesty among the participants when one of them failed to deliver a report in the appropriate manner:

You could say it like this: it was given to a higher manager to solve and had to be sorted out there with everyone involved, and then it was resolved, but not everyone was happy afterwards that it had to go that far to be resolved. (Episode 9, Interview, County Administrative Board)

The second concerns episodes where, although inadequacy is voiced, the group or individual is still overwhelmed, and the outcomes of action (or inaction) have dire consequences - *breakdown*. As these are training scenarios, this leads to adjustments or re-runs of simulations rather than people coming to actual harm. In the first simulation we observed in the military, the group of leading participants were overwhelmed with their task to deliver a set of orders at a given time. Since this would have made the whole exercise impossible (all other functions would have been inactive), the instructors simply “rewound” the exercise and the orders were redone and delivered on time. In the police case, conflict and adversity between participants and instructors arose in the role play of the car bombing in a particularly chaotic occurrence (Episode 5). Here, instructors settled on pointing out afterwards that had this been real, the investigation would have failed.

A Model of Handling Inadequacy

Our analysis arrived at a process model of the handling of inadequacy where state of inadequacy and concurrent work is anchored in the situatedness of the simulation. In the following, we describe how this handling is manifested in relation to the task, the scenario and the people involved. Figure 1 is a layout of the process of handling inadequacy, which summarizes the main points of our findings. As stated in the methods section, this model was constructed using 10 particular episodes from all three

organizations, where we identified either manifest or latent signs of experiences of inadequacy. As all models, this is a simplification of a complex and often iterative process. We warn against interpreting the model linearly as the constituent parts are sometimes simultaneously occurring or even appears in another order.

In summary, our model departs from the observation that participants acted to acknowledge inadequacy in diverse ways, either through voicing or hiding inadequacy. Participants also attributed inadequacy – either as personal, team/group, inadequate practices or situational. If acknowledged and voiced, participants also engaged in work to handle and cope with inadequacy, of which there are several types of work which in turn is dependent on the attribution and acknowledgment. Working with inadequacy can be categorized as either reflexive (backward looking) or proactive (forward looking). However, the event that is simulated, and arguably also “real” instances of crisis, have a dynamic that forces participants to move from reflexive to proactive work. We have labelled this dynamic as “urgency” (Anderson, 2017; Orlove et al., 2024) and it has distinct bearings on high-pressure, high stakes and time-sensitive scenarios.

Discussion

This article sought to answer the question of how participants in a simulation handle inadequacy. By this, we aim to extend scholarly discussion of professional learning in high pressure, time-sensitive, and unpredictable scenarios. In some settings, simulations are the only way to learn in a safe way. Such settings include extreme contexts where life is at risk. We argue that inadequacy is a fruitful way to start an analysis of how individual agents and organizations prepare for extreme events.

This study has explored how inadequacy shapes learning and decision-making processes and how participants in simulations handle this challenge. Our findings show that decisions, or the lack thereof, are directly influenced by how inadequacy is recognized and attributed. Whether inadequacy is acknowledged, who it is attributed to, and how it is addressed greatly impact how participants make sense of the situation and proceed with decision-making. These insights bring new depth to the conceptualization of practice, showing how inadequacy can disrupt the flow of activity and trigger reflective and proactive responses.

The Role of Inadequacy in Practice Theory

Inadequacy as a concept have implications for how we conceptualize practice. Our findings illustrate what happens in circumstances where action is not driven by absorbed coping or an uninterrupted “being-in-the-world” (Sandberg & Tsoukas, 2020). Instead, inadequacy is a state which involves a sense of being “thrown out” of the flow of activity. Earlier educational research has, for instance, conceptualized this as “disorientating dilemmas” (Vaughan et al., 2014) While these dilemmas are experienced as stressful, they also have great potential to advance learning. Similarly, we also show how a flow of activity can be resumed, and

while this disruption can lead to breakdowns and failure, it can also offer opportunities for participants to resume activity in ways that generate learning and adaptation. Here, we believe that inadequacy can be a prerequisite for emergence – that is, when practice give rise to new social phenomena, structures, or patterns (Hager, 2012). Learning preparedness for the unexpected, thus involves learning to work with inadequacy. This insight can inform discussions on how practitioners handle inadequacy in extreme contexts, moving beyond individual responsibility toward a more collective understanding. Building a collective understanding of inadequacy is vital for fostering resilience in extreme contexts. Such an understanding shifts the focus from individual blame to shared responsibility, creating opportunities for team learning, innovation, and adaptive practices. In such contexts, inadequacy becomes a shared concern that drives collaboration and joint problem-solving.

Our findings suggest that for this kind of learning to happen, two conditions must be met. First, inadequacy must be voiced. Consequentially, a practice must be experienced as psychologically safe (Edmondson & Bransby, 2022) for agents to dare to voice inadequacy, which can be assumed is exposing an individual or organizational vulnerability. Psychologically safe environments exist where team members feel safe to express vulnerabilities, admit mistakes, and discuss challenges without fear of judgment or retribution (Edmondson & Bransby, 2022). Second, addressing inadequacy requires actively managing the situation, which might involve some degree of reflective effort. However, when participants experience a sense of urgency (Orlove et al., 2024), they are often driven toward proactive responses, such as adopting innovative solutions or acceptance of the situation as it is. The latter aligns with Fraher et al.'s (2017) concept of “embracing the suck,” where individuals accept and adapt to challenging circumstances. These findings highlight how inadequacy not only contributes to the breakdown of practices but also fosters innovation, emergence (Hager, 2012), and professional learning.

However, the danger of “hiding” inadequacy—whether through silence, blame-shifting, or denial—can undermine resilience. When inadequacy is concealed, teams may fail to identify root causes of problems, perpetuating cycles of dysfunction and missed opportunities for growth (Weick, 1995). Addressing inadequacy openly requires cultivating a culture of trust and openness, where leaders model transparency and encourage constructive dialogue. In doing so, organizations can harness inadequacy as a driver of collective learning and resilience, transforming it from a source of disruption to a catalyst for improvement and innovation.

A collective understanding of inadequacy also has consequences for our understanding of how simulations prepare for extreme events. Extant theorizing of extreme events has not paid much attention to the use of scenarios for such training. This is surprising as it is suggested that it is difficult to learn for future extreme events. Viewing simulations from a practice point of view, we can see how “real” and simulated practices are bundled and inform one another (Ahn & Nyström, 2023; Hopwood et al., 2016). We find that even if simulations are made-up scenarios with limits originating in the task, the scenario and the

people involved, they are still useful for exposing inadequacies. By identifying these inadequacies, learning opportunities arise. Our findings show that, although simulations are controlled and limited by the task, scenario, and participants, they are effective at exposing inadequacies. These inadequacies create learning opportunities by revealing gaps in both individual and organizational preparedness, making simulations valuable beyond the replication of reality. This suggests that simulations are less about fidelity and more about the creation of a conceptual space where participants can practice restoring order and meaning in the face of chaos. This insight underscores the importance of designing simulations that allow for both reflective learning and proactive engagement.

Practical Implications

The findings of this study have several practical implications for practitioners who are preparing for extreme events as well as for any organization that uses simulation as a learning activity. By addressing these aspects, organizations can better navigate the complexities of inadequacy and improve their readiness for future crises.

To effectively address inadequacy, organizations must create environments where individuals feel safe to express their feelings of inadequacy (Edmondson & Bransby, 2022). Encouraging the open voicing of inadequacy is critical because it allows participants to acknowledge and address gaps in their knowledge or performance, which is essential for both learning and adaptation. In psychologically safe environments, individuals are more likely to speak up about challenges, thus enabling organizations to identify and address issues before they become critical. Fostering this culture of openness not only improves individual performance but also enhances team dynamics by ensuring that inadequacy is seen as a shared experience rather than a personal failure.

Connected to the former point, instructors in simulations as well as organizations must be mindful of how inadequacy is attributed. Participants should recognize that inadequacy is often the result of systemic or organizational shortcomings, rather than simply individual failings. By acknowledging that inadequacy can stem from broader structural issues, participants can avoid placing blame on individuals and instead focus on collective problem-solving. This shift in attribution encourages a more constructive response to inadequacy, where participants are empowered to seek improvements within the systems and practices, rather than internalizing failure and becoming demotivated. This is why attribution of inadequacy is an important point for reflection and discussion. Debriefings or evaluations conducted after a simulation or scenario training could constitute important points for these reflections, as the participants are then given opportunities to discuss where inadequacies arose, how to attribute them, and how to work with them in future encounters.

Finally, while the urgency of extreme events often drives participants toward immediate, proactive action, it is equally important to balance this urgency with reflection. As shown, these simulations of extreme events tend to push teams into proactive work, but taking the time to reflect on decisions, actions, and outcomes

is crucial for long-term learning and preparedness. Integrating moments of reflection into crisis management processes allows teams to evaluate their responses, identify areas for improvement, and build a more resilient organizational framework. By balancing urgency with reflective practices, organizations can ensure they are not only reacting to crises but also learning from them to improve future responses.

Conclusion

In conclusion, this article has explored how participants in simulations of extreme events handle inadequacy, offering new insights into professional learning in high-pressure and unpredictable scenarios. Our findings reveal that inadequacy plays a crucial role in shaping both individual and organizational responses to crisis situations. Rather than viewing inadequacy as a personal shortcoming, we argue that it is a socially constructed experience that emerges from interactions within practices. This reframing allows for a more nuanced understanding of how inadequacy disrupts routines while also creating opportunities for learning, innovation, and adaptation.

Our study also underscores the value of simulations in preparing for extreme events. While simulations are controlled, artificial scenarios, they are effective at exposing inadequacies, offering valuable learning opportunities by revealing gaps in both individual and organizational preparedness. Importantly, simulations are less about faithfully replicating reality and more about creating conceptual spaces where participants can practice restoring order and meaning in the face of disruption. This insight emphasizes the importance of designing simulations that balance urgency with reflective learning, ensuring that participants are not only reacting to immediate challenges but also given time to reflect and learn.

In sum, this article contributes to the broader discussion on how organizations learn preparedness for extreme events by highlighting inadequacy as a central factor in both individual and collective learning. By fostering environments where inadequacy can be voiced, thoughtfully attributed, and constructively addressed, organizations can better navigate crises and improve their readiness for future challenges.

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Data Availability The datasets generated and analysed during the current study are not publicly available to protect the identity of the participants, but sections of the data without identifiers are available from the corresponding author on reasonable request.

Declarations

Ethical Approval This study did not require ethics approval as the data collected and analysed do not fall under the provisions of the Swedish Ethical Review Act (2003:460) or other applicable Swedish legisla-

tion for research ethics. The research was conducted in full compliance with the Swedish Code of Statutes and all relevant ethical guidelines for research involving human subjects.

Competing Interests The authors declare no competing interests.

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