WhatsApp as Communication Infrastructure in Volunteer-Based EMS

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ABSTRACT

Recent geopolitical developments have renewed attention to the need for scalable emergency medical systems capable of operating under conditions of heightened risk. In this work-in-progress paper, we examine how WhatsApp functions as a communication infrastructure in volunteer–professional emergency medical collaboration. Drawing on qualitative interviews and screenshot elicitation across five community sites, we analyze how messaging practices and digital affordances support mobilization, coordination, and situational awareness. The findings indicate that WhatsApp's interactivity and scalability complement formal dispatch systems by enabling real-time manpower governance, peer-to-peer coordination, and adaptive response calibration. Beyond operational coordination, messaging practices and WhatsApp's multimediality also support post-incident closure and collective sense-making. The study further shows how communication infrastructures operate in a layered configuration alongside dispatch applications, radio systems, and phone calls, what practitioners describe as a "triangle of technology." Finally, professional and volunteer roles appear operationally intertwined, particularly within a security-embedded context where medical and security considerations coexist.

Keywords

Volunteers, Medical emergency response, First responders, Messaging platforms

INTRODUCTION

Recent armed conflicts have introduced new forms of threat to civilian populations. Advances in long-range strike capabilities, unmanned systems, and low-cost precision technologies mean that areas once considered geographically distant from kinetic violence are no longer beyond reach (Fayet & Péria-Peigné, 2024). The ability of adversaries to project force across longer distances, at lower financial and logistical cost than before, has fundamentally altered the risk landscape for many societies. This shift has significant implications for civilian protection and for the preparedness of emergency and medical services. In many Western countries, emergency medical systems are primarily organized for peacetime conditions, with structured preparedness for natural disasters but comparatively limited experience in managing large-scale, sustained armed conflict on national territory.

Medical services in these Western contexts are typically run by professional organizations with standardized staffing models, clear legal mandates, and established command structures. Reliance on volunteers is often limited, regulated, or reserved for specific roles. However, in the event of armed conflict, the scale and intensity of casualties may exceed existing surge capacities. To meet such demands, professional systems must be able to rapidly scale up (Jaffe et al., 2024). To do so, volunteers represent a potentially valuable resource in this regard. Yet, integrating medical volunteers into formal systems is not straightforward. Legal frameworks, liability concerns, training requirements, insurance arrangements, and the absence of suitable communication infrastructures may all pose barriers.

This paper is part of a pilot project aimed at learning from medical service models that already rely on volunteers to enhance operational capacity. Particular attention is directed toward the communication infrastructures that enable such collaboration. Specifically, we examine how the messaging platform WhatsApp functions as a

communication infrastructure in the mobilization and coordination of volunteers. Although our empirical material primarily captures routine and major incidents, it shows how everyday coordination practices in a security-embedded EMS can inform thinking about scalable surge capacity.

RELATED WORK

Research on volunteer involvement in emergency response has increasingly examined how information and communication technologies (ICT) enable structured collaboration between citizens and professional services. Early studies demonstrated that smartphone-based alert systems could mobilize trained lay responders to out-of-hospital cardiac arrests before ambulance arrival, thereby reducing response times (Ringh et al., 2015). Subsequent large-scale studies confirm that app-based dispatch systems can significantly improve early intervention (Gregers et al., 2023). These systems are now institutionalized in several European contexts as structured volunteer first responder models embedded within formal emergency medical services (EMS).

Recent Scandinavian research conceptualizes such initiatives as forms of ICT-enabled co-production. Alkusaibati et al. (2025) show that volunteers frequently arrive before professional units and contribute to tasks such as cardiopulmonary resuscitation (CPR), traffic control, and fire suppression. Effective integration depends on reliable dispatch infrastructures, structured training, and clearly defined collaboration routines.

Similarly, Mohamed and Pilemalm (2025) demonstrate that smartphone applications are central for dispatch, navigation, and mission acceptance across Swedish volunteer initiatives. However, they also note that existing dispatch applications primarily support alerting and individual task acceptance and often lack built-in mechanisms for peer-to-peer coordination during ongoing incidents. This suggests that coordination beyond initial dispatch may rely on supplementary communication channels.

Beyond operational coordination, the design of dispatch systems also shapes volunteer retention. Prytz et al. (2023), in a large-scale survey of Swedish volunteer responders, identify alarm fatigue as one of the strongest negative predictors of continued engagement. Their findings indicate that frequent or poorly calibrated alerts, as well as alerts at inconvenient times, can significantly reduce motivation to remain active. They argue that improved dispatch algorithms that avoid over-alerting and better align alert volume with actual needs may strengthen volunteer retention. This highlights that volunteer mobilization is not only a matter of rapid activation, but also of sustainable alert governance.

While these structured volunteer models represent a high degree of institutional integration, the broader disaster literature highlights that mobilization is rarely frictionless. Whittaker et al. (2015) distinguish between organized and spontaneous volunteerism, emphasizing coordination challenges when large numbers mobilize rapidly. Harris et al. (2017) describe the "involvement/exclusion paradox," in which authorities both depend on and seek to regulate volunteers. Schmidt et al. (2018) conceptualize volunteer convergence as a coordination problem requiring digital support mechanisms. Together, these studies suggest that volunteer mobilization is not only about recruitment and dispatch, but also about governance, calibration of manpower, and real-time coordination.

Alongside purpose-built dispatch applications, widely available messaging platforms have increasingly been used to address these coordination needs. Lee et al. (2024) show how WhatsApp functions as a real-time communication infrastructure in Garissa County, Kenya, connecting dispatchers, ambulance crews, and hospitals. The platform enables rapid information exchange, advance notification, and administrative oversight, while also raising concerns regarding information overload and data governance. In disaster research more broadly, social media and messaging platforms have been analyzed as coordination artefacts that support distributed collaboration when formal systems are insufficient (Reuter et al., 2017; Roitman & Yeshua-Katz, 2022).

Conceptually, these developments can be understood through the lens of co-production. Ostrom (1996) defined co-production as the joint provision of public services by citizens and public agencies, and Alford (2014) elaborated how such collaboration may range from complementary support to deeply integrated arrangements. In emergency management contexts, digital technologies increasingly mediate these relationships. Recent work conceptualizes this as digitalized co-production, where technological infrastructures shape how volunteers are mobilized, coordinated, and governed (Pilemalm & Alkusaibati, 2024).

However, existing research has largely examined either formal dispatch applications embedded in institutionalized EMS systems or large-scale crisis convergence. Less attention has been paid to how informal messaging platforms operate alongside official dispatch systems in everyday volunteer–professional collaboration. In particular, we know little about how such platforms function as layered communication infrastructures that support peer coordination, manpower calibration, and situational awareness after initial dispatch. This gap is especially salient in contexts where rapid mobilization, resource constraints, or heightened security risks require flexible yet coordinated interaction between volunteers and professional responders.

To further conceptualize how WhatsApp supports coordination, we draw on digital affordances framework (Evans et al., 2017; Gibson, 1979/2014), which focuses the possible and actual outcomes of the relation between the object or technology and the human user. Applying the affordances approach helps one to examine, for example, the relation between affordances of organizational communication channels in healthcare organizations and safety and risk communication (Barrett et al., 2020). In the context of layered communication infrastructures that support EMS professionals and volunteers, affordances such as interactivity (Baym, 2015) and mobility (Schrock, 2015) can contribute to mobilization efforts.

METHOD

This paper is based on a qualitative pilot study employing in-depth interviews (Van Maanen, 2011) and ethnographic observations (Hammersley & Atkinson, 2007) carried out during a short field study that constitutes a form of "quick and dirty ethnography" (Hughes, King, Rodden, & Andersen, 1994). Data were collected between 9th and 19th February 2026 across five community sites in Israel (two Jewish towns, two Arab towns, and one kibbutz) through in-depth interviews with nine active members of Israel's national emergency medical services (EMS), Magen David Adom (MDA).

Participants were recruited through the research team's professional networks and via snowball sampling. Initial participants were identified through the first author's connections within relevant MDA stations and were subsequently asked to refer additional eligible participants. This approach facilitated access to a dispersed and experience-based population that is not easily reachable through formal sampling frames. The interviews were conducted primarily in English; when necessary, the first author conducted interviews in Hebrew and translated them verbatim into English. Ethical approval was obtained from the Ethics Committee of the Spitzer Department of Social Work at Ben-Gurion University of the Negev. In addition, the study was conducted with the agreement of Magen David Adom (MDA), which granted access to its personnel and organizational setting. The study adhered to informed consent procedures, strict anonymization, and careful avoidance of operational or tactical details. The actual names have been replaced with fictional names to ensure anonymity.

An innovative method, *screenshot elicitation*, was employed to examine digital communication within closed responder groups in an ethical and collaborative manner. Prior to each interview, we asked participants to identify four meaningful interactions from their first responders' digital groups. During the semi-structured interviews, we used these screenshots as elicitation prompts, grounding discussion in concrete digital exchanges. This approach generated dual-layered data: visual-textual records of interactions alongside participants' interpretive accounts. All screenshots were anonymized to remove identifying details, and pseudonyms were used.

All interviews were transcribed (and translated when necessary) and analyzed using thematic analysis (Braun & Clarke, 2006). The analysis focused on communication tools, adaptive practices, coordination dynamics, and interactions between EMS employees and volunteers. We worked iteratively with the material, moving back and forth between transcripts and screenshots to identify recurring patterns. Coding did not follow a strictly linear process; instead, emerging codes were continuously examined, compared and gradually developed into more abstract thematic groupings.

The analysis was conducted in dialogue between the authors. We paid particular attention to how digital infrastructures both shape and are shaped by organizational practices. The process resulted in a set of candidate themes, which were refined into three overarching themes capturing central patterns of communication and coordination. These themes form the basis of the findings presented below. While our prior familiarity with the context facilitated access and informed the analysis, we maintained an explicitly analytical distance to the material. This involved ongoing reflexive attention to potential biases and a deliberate effort to question taken-for-granted assumptions.

FINDINGS

The analysis resulted in three main findings: (1) scalable mobilization and manpower governance, (2) layered communication infrastructure, (3) professional–volunteer collaboration in a security-embedded response environment.

1. Scalable mobilization, manpower governance, and closure

A central finding concerns the system's capacity for rapid and flexible mobilization. Interviewees described situations in which a large number of volunteers responded to an alert. At times, more responders arrived than were operationally required. This required active coordination to stand down some individuals. Such decisions were described as pragmatic and routine.

Figure 1 below is a reconstruction of an actual chat thread on WhatsApp that illustrates a typical flow of communication to mobilize and to govern the manpower in the event of a person suffering from cardiac arrest.

The MDA volunteer coordinator receives an alert through the official MDA dispatch application. An ambulance staffed with a paramedic is dispatched to the location. While the ambulance is en route, the volunteer coordinator leverages the immediacy and scalability of WhatsApp to activate the local response network by posting an alert in the designated WhatsApp group for that specific geographic area. The message contains necessary operational textual information: the type of incident (cardiac arrest) and the location. Patient details are limited here, reflecting the awareness of maintaining patient privacy.

Within seconds, WhatsApp's high interactivity enables the first volunteer to confirm being on the way. Two additional volunteers respond shortly thereafter, demonstrating both availability and high situational readiness. When a fourth volunteer confirms their response, the coordinator determines that sufficient manpower has been secured. The coordinator then uses WhatsApp's interactivity and mobility to communicate to the group that no further responders are required and asks others to remain on standby.

WhatsApp Group: Medical Volunteers – Area South
Type of Incident: Cardiac Arrest

14:03:12 – Volunteer Coordinator: ALERT – CARDIAC ARREST
Male, approx. 62 years
Location: Alsalam street 18, outside grocery store
14:03:20 – Volunteer 1 (Leah R.): On my way.
14:03:27 – Volunteer 2 (David M.): On my way.
14:03:55 – Volunteer 3 (Zara K.): On my way.
14:04:01 – Volunteer 4 (Noa S.): On my way.
14:04:20 – Volunteer coordinator: Four confirmed on their way.
No additional volunteers needed at this time.
Please remain on standby.

Figure 1: Reconstructed WhatsApp-dialogue

WhatsApp seems to play a key role in this process of manpower calibration. Coordinators leverage the scalability of group messaging to upgrade or downgrade the number of responders as new information becomes available. If an incident is less severe than first assumed, volunteers are asked to return home. If conditions deteriorate, additional personnel can be mobilized quickly. Mobilization is therefore not a linear process but an adaptive one. The system depends on real-time communication to regulate engagement and maintain proportional response.

Another way first responders use WhatsApp is to achieve closure. In the following example, after an MDA team completed its service and returned to the station, a volunteer draws on WhatsApp's multimediality to share an image of a traffic accident scene in the group. The image depicted a wrecked car and an MDA ambulance; the volunteer ensured there was no identifying information, such as license plates or people's faces. As Noah explained:

> *"There is no real necessity or added value in sharing these pictures just for curiosity. Rather, [the first responder shares] to say, 'This is the event I was at; I treated two people,' and then shares a bit of information about what happened at the scene."*

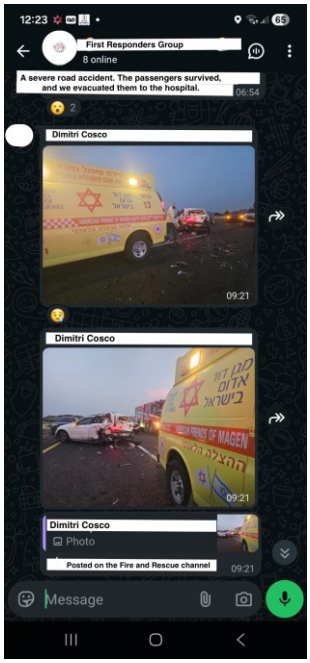

Figure 2: Screenshot

This example illustrates how post-incident image sharing functions less as operational communication and more as a socially meaningful act. The sharing of images after an incident can thus be understood as a communicative practice oriented toward closure rather than information exchange. Although the operational phase of the response has ended, the digital interaction continues. By posting a multimedia message, an anonymized image accompanied by a brief textual description, the volunteer symbolically completes the assignment in the presence of peers. The act does not primarily serve coordination or clinical learning; instead, it acknowledges participation, documents contribution, and situates the responder within the collective narrative of action.

2. Layered communication infrastructure

A second finding concerns the coexistence of multiple communication channels including a formal dispatch application, local first responders' WhatsApp groups, radio communication (walkie-talkies), and personal mobile phones. The formal dispatch application (the MDA app) is primarily used to issue initial alerts and provide location data to the five nearest responders. However, because this application lacks interactive capabilities, WhatsApp's high interactivity and multimediality serve as a vital complementary layer for real-time coordination.

Through WhatsApp, responders refine situational awareness by sharing GPS pins or live positions to clarify incident locations. While text messages are used for short situational updates, photos and voice messages are preferred when rapid descriptions are required. Voice messages are particularly valued for their efficiency and safety, allowing responders to communicate critical information without the delays or risks associated with typing while driving.

Yasin recounted a dispatch call for a structure fire where responders used a WhatsApp group to coordinate their efforts. The initial text message detailed the city, neighborhood, and the nature of the emergency. Almost immediately, a video was shared depicting thick black smoke billowing from a residence. Yasin emphasized the critical role of this visual data:

> *"When I see an image with thick black smoke, I recognize it as a serious fire. This helps me decide to send additional first responders, as it confirms the situation is critical."*

Despite the operational advantages of WhatsApp, interviewees acknowledged that sharing multimedia via the platform involves significant ethical and privacy considerations. Operational usefulness must be constantly balanced against the sensitivity of the data and the privacy of those involved.

Smartphone calls serve as an auxiliary channel, particularly when traditional radio systems fail or when a responder is positioned too far from the ambulance's transmitter to maintain a clear signal. In these instances, the dispatch center maintains contact with the responder via mobile phone to ensure rapid and uninterrupted communication. Ahron described this dynamic:

"Very often, we also use the phone during major events. If I am the first at the scene, dispatch calls me on my phone. They ask me to describe what is going on because as soon as you leave the ambulance, you don't have the walkie-talkie anymore. So they call and say, 'Okay, describe what's going on. Do you need more assistance? What do you need?' You describe the situation, and then they leave you to start treating [patients]. But for the first two to three minutes, they stay on the phone with you to understand the situation."

For complex or prolonged incidents, radio communication remains a central tool for structured command. While WhatsApp provides the scalability and immediacy necessary for initial coordination, the radio supports structured and sustained coordination. Ultimately, the communication system is thus layered, effectively combining formal dispatch, messaging-based coordination, supplementary phone communication, and radio-based command to manage emergency events.

Taken together, this theme reflects what MDA officers themselves describe as a "triangle of technology". This emic term captures their understanding of a layered communication infrastructure in which no single channel is sufficient on its own. Rather than replacing one another, the dispatch application, WhatsApp, radio systems, and personal mobile phones operate as interdependent layers, each compensates for the limitations of the others. The dispatch app ensures structured and geographically targeted alerts. WhatsApp affords rapid, scalable, and multimedia-rich coordination. The radio communication provides formal command and sustained control. While the mobile phones function as a resilient backup when other systems fail.

This layered configuration requires responders to constantly navigate between platforms, interpret information across media formats, and balance operational efficiency with ethical considerations regarding privacy and data sensitivity. The "triangle of technology" thus reflects not only a technical arrangement but also an organizational competence. It makes visible the ability to fluidly shift between communication modes depending on the evolving demands of the incident. In this sense, emergency response communication has evolved into an ecology of tools, an infrastructure with a layered and overlapping design.

3. Professional–volunteer collaboration in a security-embedded response environment

Collaboration between volunteers and professional medical staff is expressed as established and routine. Nevertheless, it is also described as multi-faceted and dependent on the specific actors involved. Volunteers and professionals work side by side in everyday response activities. Volunteers are not described as peripheral supporters but as integrated contributors within ordinary operational structures. Some volunteers are highly active and accumulate substantial operational experience through frequent participation in incidents. Professionals emphasize that effective cooperation depends both on their own ability to make appropriate use of volunteers onsite and on the level of experience the volunteer brings. The dynamics therefore vary from incident to incident.

On some occasions, a large number of volunteers respond and arrive at the scene.

"In some situations we have too many onsite and we do not need them. So I need to turn them back and tell them to leave. It is sometimes disappointing for someone who has rushed to the site" (Elias).

When this occurs, professionals must actively manage how many individuals should remain and how many should be asked to no longer be onsite. This is described as a practical coordination task requiring situational judgement.

In other situations, the severity of the incident may challenge volunteers with limited experience. Professionals describe a need to ensure that volunteer involvement does not unintentionally slow down clinical work in high-intensity cases. In particularly complex or critical events, professionals may carefully assign tasks or restrict certain forms of participation in order to maintain efficiency and control.

"In wartime situations and mass casualties, volunteers are not always the best resource since they lack enough experience of terrible situations"(Amit).

Most often, however, volunteers are described as a significant operational resource. They contribute by early intervention in critical moments before ambulance arrival and provide important physical capacity in demanding situations. Their presence strengthens response capability, especially when rapid manpower is required.

Professionals highlight the importance of experienced volunteers. At the same time, experience requires exposure. This creates a practical tension: volunteers need participation to develop competence, yet excessive exposure to severe or traumatic incidents may be challenging. This concern is particularly noted in relation to younger volunteers, where too much exposure to difficult situations is described as undesirable.

On the kibbutz, individuals may hold multiple roles simultaneously, including medical, fire, and security

responsibilities. This multi-functionality reflects a locally embedded organizational culture in which flexibility is expected. The same person may shift between functions depending on the unfolding situation.

Security considerations are expressed as being a difficult aspect of everyday operations. Incident scenes may involve ongoing tensions or violence. Responders assess not only patient needs but also situational risks. This dual awareness is described as normalized rather than exceptional. The presence of weapons among some professional paramedics, and within the kibbutz context, reflects an environment in which medical and security considerations coexist. Preparedness includes both clinical competence and attentiveness to security.

WhatsApp serves as a channel for both medical coordination and security-related situational updates. Brief messages in group threads can inform responders en route about disturbances, instability, or the need for caution upon arrival. Such updates contribute to shared awareness and support safer entry into potentially unstable environments.

DISCUSSION

This study set out to explore how WhatsApp functions as communication infrastructure in volunteer–professional emergency medical collaboration within a surge-capacity context. The findings contribute to existing literature on ICT-enabled co-production in four complementary ways.

First, while prior research on volunteer responder systems has primarily focused on formal dispatch applications and structured alert systems (Ringh et al., 2015; Gregers et al., 2023), our findings highlight what happens *after* initial dispatch. Consistent with Mohamed and Pilemalm (2025), the official dispatch application in this context primarily supports alerting and individual task acceptance. However, peer-to-peer coordination, manpower calibration, situational clarification, and post-incident closure are largely managed through WhatsApp's interactivity. This suggests that mobilization should not be conceptualized as a single technological event but as an ongoing coordination process requiring layered communication support.

Second, the findings extend discussions on volunteer governance and convergence (Whittaker et al., 2015; Schmidt et al., 2018). Rather than uncontrolled convergence, mobilization in this case appears actively governed through real-time digital communication. WhatsApp's high interactivity enables coordinators to upgrade or downgrade manpower and manage surplus presence at incident scenes by standing down responders when sufficient capacity has been secured.

At the same time, practices such as post-incident image sharing illustrate that WhatsApp's multimediality also serves social and symbolic functions, reinforcing belonging and providing closure. Mobilization is therefore not only about operational efficiency but also about sustaining engagement. While this pilot did not assess volunteer retention outcomes, the closure-oriented exchanges observed suggest one way communication practices may shape volunteer experience beyond dispatch frequency. This connects to research on volunteer retention and alarm fatigue (Prytz et al., 2023). While dispatch algorithms influence alert frequency, our findings suggest that interactive peer-level communication may also shape volunteer experience. The ability to see, narrate, and symbolically complete an incident within the group may contribute to meaning-making and collective identity. In this sense, communication infrastructure supports both operational calibration and motivational sustainability.

Third, the study highlights the importance of layered communication infrastructures. Echoing research on messaging platforms in emergency contexts (Lee et al., 2024; Reuter et al., 2017), WhatsApp operates alongside formal dispatch systems, radio communication, and phone calls. Interpreting our findings through the lens of digital affordances (Evans et al., 2017; Gibson, 1979) highlights how WhatsApp enables specific forms of coordination that extend beyond formal dispatch systems. The platform's capacity for real-time group communication, visibility of responses, and multimedia sharing supports continuous adjustment of manpower, situational awareness, and coordination across actors. These affordances do not operate in isolation but within a layered communication infrastructure, where different tools complement one another. In this sense, coordination emerges from the interaction between technological affordances and organizational practices. What MDA officers describe as a "triangle of technology" illustrates how different media compensate for one another's limitations. The dispatch app structures alerts; WhatsApp enables flexible, multimedia-rich coordination; radio maintains formal command; phones provide redundancy. Rather than technological substitution, the system demonstrates infrastructural layering. At the same time, participants emphasized that the operational benefits of multimedia sharing require ongoing ethical and privacy balancing, reinforcing that layered infrastructures also entail governance of sensitive information.

Finally, the findings extend co-production literature (Ostrom, 1996; Alford, 2014; Pilemalm & Alkusaibati, 2024) by demonstrating how professional and volunteer roles, while analytically distinct, may be operationally intertwined in practice. The effectiveness of collaboration depends on experience, context, and the professional's capacity to orchestrate available manpower. In addition, the security-embedded environment further intertwines medical and safety considerations. Clinical assessment and risk awareness coexist within the same communicative networks. This suggests that digitalized co-production in high-risk environments is not merely about integrating volunteers into professional systems, but about managing hybrid, context-sensitive operational ecologies.

CONCLUSION

This work-in-progress paper examined how WhatsApp operates within a volunteer-based emergency medical system. Based on qualitative interviews and screenshot elicitation, we identified three interconnected dimensions: scalable mobilization and manpower governance, layered communication infrastructure, and professional–volunteer collaboration in a security-embedded response environment. The study suggests that mobilization is not a one-step dispatch event but an adaptive and communicatively sustained process. Interactivity and multimediality of messaging platforms such as WhatsApp extend formal dispatch systems by enabling real-time manpower calibration, situational awareness, and post-incident closure. In doing so, they contribute not only to operational flexibility but also to volunteer integration and forms of post-incident acknowledgement and closure.

For countries with predominantly professionalized EMS systems, the findings provide tentative insights into how volunteer capacity may be integrated under conditions of uncertainty and heightened security risk. Rather than relying solely on purpose-built dispatch applications, effective integration may require layered communication infrastructures capable of supporting both coordination and governance.

As a pilot study, this work has limitations. The empirical material is context-specific and reflects a security-embedded environment that differs from many Western EMS systems. Further comparative research is needed to examine how layered messaging infrastructures function in less conflict-exposed contexts and how governance mechanisms can balance flexibility, privacy, and sustainability. Nevertheless, the findings indicate that widely available messaging platforms can become central infrastructural components in digitalized co-production of emergency response. Understanding their role is therefore essential for both crisis informatics research and the future design of volunteer-integrated emergency systems.

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