An Adaptive Mobile Platform for Multi-Hazard Reporting and Community Resource Coordination

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ABSTRACT

Mobile applications for wildfire management have primarily focused on hazard awareness and incident reporting. However, disaster-resilient communities require mechanisms that go beyond reporting to enable coordinated requests for assistance, volunteer mobilization, and resource brokerage across preparedness, response, and recovery phases. This paper presents the enhanced SILVANUS-SK App, a reconfigurable mobile platform that operationalizes community resilience through integrated polls empowered by EmerPoll. Citizens and first responders can benefit from mutual collaboration provided by hazard reporting, proximity-based property monitoring, and the ability to register geographically localized assets and volunteer contributions. Template-driven workflows allow rapid adaptation to multi-hazard contexts without redeployment. The interface is optimized for low cognitive load, voice-to-intent interaction, and intermittent connectivity. We describe the system architecture, socio-technical design considerations, and a planned evaluation framework, highlighting challenges related to taxonomy development, role semantics, and information credibility. The work contributes design patterns for actionable citizen science and digitally enabled mutual aid supporting disaster-resilient communities.

Keywords

Mobile crisis application, citizen participation, disaster-resilient communities.

INTRODUCTION

Digital technologies increasingly shape how communities prepare for, respond to, and recover from disasters. Mobile applications have become important instruments for disseminating warnings, providing situational updates, and enabling citizen reporting of hazardous events. Prior work, including our earlier study on engaging the public in forest fire awareness through a mobile application, demonstrated the potential of mobile platforms to support wildfire prevention, education, and crowdsourced reporting. However, disaster resilience requires more than awareness and reporting alone.

Resilient communities depend on the capacity to exchange actionable information, coordinate assistance, and mobilize local resources under conditions of uncertainty, stress, and disrupted connectivity. During crises, citizens not only observe hazards but also express needs, offer support, and contribute capabilities. Yet many existing hazard applications emphasize one-way communication or simple incident reporting, with limited support for

structured requests, volunteer coordination, and resource brokerage integrated into responder workflows.

This paper presents the SILVANUS-SK App, an enhanced version of the SILVANUS App (Gatial et al., 2024), as a reconfigurable platform for operationalizing disaster-resilient communities. Building on earlier wildfire-focused engagement features, the application now integrates structured information flows that enable citizens to (1) report hazards, (2) request assistance such as equipment or volunteer help, and (3) offer skills, availability, or material resources. A template-driven architecture, provided by the EmerPoll platform (Balogh et al., 2016), allows rapid reconfiguration across multi-hazard scenarios without requiring application redeployment, supporting adaptability in evolving crisis contexts. The design is grounded in principles of human-centered interaction, low cognitive load, and tolerance for intermittent connectivity, combining citizen science reporting with digitally enabled mutual aid and responder validation mechanisms. In this paper, we place particular emphasis on how these workflows support spontaneous volunteers, volunteer firefighters, and community members acting as ad hoc resource providers within structured crisis coordination processes. The primary focus of the mobile application is to strengthen resilient communities by enabling public users, bystanders, and spontaneous volunteers to contribute observations, requests, and resource offers in a structured, coordinated manner with first responders. The work is being developed within the scope of the SILVANUS-SK Slovak national project, which extends the wildfire reporting of the original SILVANUS App.

RELATED WORK

Mobile applications have become increasingly prominent in disaster management, particularly in wildfire monitoring, warning dissemination, and citizen reporting. Research has explored mobile systems supporting evacuation and real-time wildfire escape planning (Kamilaris et al., 2023), emergency notification architectures (Romano et al., 2016), and standardized communication frameworks such as PEMEA (Pemea, 2020). Reviews of mobile crowdsensing technologies further demonstrate the growing role of smartphones in hazard detection, mapping, and situational awareness (Cicek et al., 2023). Our earlier work within the SILVANUS[1] project introduced a mobile application designed to raise wildfire awareness, support prevention, and enable structured fire reporting (Gatial et al., 2024). Moreover, this paper summarizes the relevant existing mobile applications and briefly compares their pros and cons. Similarly, our ISCRAM contributions have advanced polling mechanisms for crisis response performed using EmerPoll platform (Balogh et al., 2016) and communication protocols that enable structured exchanges between citizens and first responders during wildfires (Balogh et al., 2023). While these systems significantly enhance citizen-generated reporting and information dissemination, they primarily focus on hazard notification and situational awareness in the scope of wildfires.

Crisis informatics research has consistently shown that citizens act as distributed “human sensors” during emergencies, contributing observations through digital platforms and social media (Romano et al., 2016; Palen et al., 2010). Topic extraction and volunteered geographic information approaches illustrate how citizen-generated data can complement institutional monitoring (Messaoudi et al., 2022). However, much of this literature conceptualizes citizens primarily as information providers rather than as active participants, as resource providers, or as volunteers.

Volunteer engagement and spontaneous digital convergence have been widely discussed, particularly within the context of integrating informal volunteers into formal response structures. Mojir et al. (2023) highlight the importance of bidirectional communication and behavioral engagement in wildfire management. Enterprise systems such as Sahana Eden ADK or Ushahidi provide comprehensive modules for volunteer and resource management, yet these platforms are typically responder-centric and web-based (Khanh et al., 2014). Research on digital mutual aid and request – offer matching has examined computational approaches to linking needs and resources through social media streams, but these approaches often rely on post hoc text mining rather than structured mobile workflows and also face security restrictions on posted text that prevent processing globally.

Disaster contexts also frequently involve degraded or intermittent connectivity. Studies on communication failures during crises underline the fragility of network infrastructures (Bailis & Kingsbury, 2014), while MQTT-based and store-and-forward mechanisms have been proposed to mitigate connectivity disruptions in structured crisis communication (Balogh et al., 2023). Despite these technical advances, relatively few studies evaluate citizen-facing interaction models under high stress, intermittent connectivity, and multi-hazard adaptation constraints, nor do they explicitly assess the operational actionability of citizen-generated inputs.

At the same time, international frameworks such as the Sendai Framework for Disaster Risk Reduction emphasize whole-of-society resilience, highlighting anticipatory, adaptive, and absorptive capacities within communities (UNDRR, 2019). Resilience depends not only on receiving warnings but also on the ability to coordinate assistance, mobilize local capabilities, and share resources effectively. Yet the existing literature largely treats

[1] SILVANUS Horizon 2020 Green Deal project https://silvanus-project.eu/

reporting systems, volunteer coordination platforms, and resilience frameworks as separate strands.

RESEARCH APPROACH AND REDESIGN BASIS

This paper reports an iterative approach to redesigning the original SILVANUS App rather than developing the application from scratch. The redesign is based on four inputs: related research, lessons learned from the SILVANUS App, findings from pilot demonstrations of the original application, and feedback from practitioners, including professional and volunteer firefighters.

These inputs were transformed into three design requirements that shape the features of the redesigned application: disruption-tolerant communication with possible intermittent connectivity, template-driven multi-hazard configurability, and structured citizen-responder coordination, including support for volunteer contributions and offers. The redesigned application was developed into a test version that addresses these requirements through architectural changes described in the following sections.

The contribution of this paper lies especially in a transparent, iterative redesign of an existing crisis application based on prior research, field testing, practitioner input, and public requirements for mobile application adoption. The redesigned application is still undergoing iterative updates, testing, and evaluation.

GAPS IN MOBILE APPLICATION

Although ISCRAM research has extensively examined crisis communication technologies and citizen-generated data, fewer contributions explicitly operationalize disaster resilience through integrated mobile infrastructures that combine hazard reporting, assistance requests, capability offers, and responder-mediated validation within a unified system. The initial version of the SILVANUS App – developed primarily for wildfire reporting and citizen engagement – provided valuable insights into mobile-supported awareness and situational information exchange. However, field deployment revealed limitations that constrained its broader applicability as a resilience-oriented coordination platform.

The original application consisted of two principal modules: (1) a fire reporting module enabling geolocated incident reporting with multimedia attachments, and (2) a citizen engagement module providing educational content and prevention guidance. While effective for awareness-raising and structured reporting, the system remained largely wildfire-centric and focused on reporting.

To identify improvement requirements, structured evaluations were conducted during field demonstrations and pilot exercises across multiple European sites between April 2023 and October 2024 (Table 1). These demonstrations covered diverse environmental conditions, varying terrain characteristics, and heterogeneous communication infrastructures. Feedback from practitioners, particularly professional and volunteer firefighters, focused on usability, communication constraints, localization accuracy and coordination challenges.

Table 1. Field findings from the original SILVANUS App that motivated the redesign.

Pilot Site	Date	Findings
Slovakia Pilot 1, Poľana	April, 2023	Limited mobile data connectivity (3G coverage in several areas)
Czech Pilot 1, Krásná	October, 2023	Slow mobile data connection; imprecise fire localization
Czech Pilot 2, Krásná	June, 2024	Testing of distance metering; voice control suggested
Italian Pilot, Tepilora	September, 2024	Lack of connectivity; postponed data upload required
Slovakia Pilot 2, Zvolen	October, 2024	Distance metering validation; report and notification testing
Croatia Pilot, Vučevica	October, 2024	Fire reporting and notification testing

Across pilot sites, three systemic gaps emerged that extend beyond incremental usability refinements and instead indicate structural design limitations:

- Intermittent Mobile Connectivity as a Structural Constraint.

Remote and forested environments frequently exhibited unstable, degraded, or absent mobile data coverage. The initial application design implicitly assumed near-continuous connectivity, limiting its operational reliability under realistic field conditions. This highlighted the need for disruption-tolerant communication mechanisms that

ensure eventual message delivery without increasing the cognitive burden on users under stress.

- Hazard-Specific and Administratively Fixed Reporting Taxonomies.

The wildfire-centric configuration limited sustained engagement and cross-domain applicability. Although additional channels were introduced (e.g., wildlife sightings, negligence reporting), channel creation remained administratively managed and inflexible. Field discussions emphasized the need for a generalized, easily reconfigurable reporting architecture adaptable to diverse incident types and evolving local requirements.

- Limited Integration Between Citizens and First Responders.

While the system enabled citizens to report hazards and receive notifications, it did not sufficiently support coordinated action beyond information exchange. Practitioners emphasized the potential value of integrating community knowledge, local resources, and volunteer capacities into operational workflows. The absence of structured mechanisms for assistance requests, capability offers, and responder validation constrained the platform's potential to support disaster-resilient communities.

Taken together, these findings reframed the application not merely as a wildfire reporting tool requiring technical refinement, but as a socio-technical system requiring architectural redesign. Connectivity failures motivated QoS-based buffering and deferred media upload, localization difficulties motivated map refinements and distance-support features, and coordination gaps motivated structured request-offer workflows and asset registration. The identified gaps translate into three core design requirements: (1) disruption-tolerant communication under intermittent connectivity, (2) template-driven multi-hazard configurability, and (3) structured citizen–responder coordination enabling validated mutual aid and resource brokerage.

The field demonstrations summarized in Table 1 evaluated the earlier SILVANUS App and served as input for the redesign presented in this paper; they should therefore be understood as evidence motivating the SILVANUS-SK App rather than as an evaluation of the redesigned system.

SYSTEM DESIGN: A RESILIENCE-ORIENTED, RECONFIGURABLE CITIZEN–RESPONDER PLATFORM

The SILVANUS-SK App is designed as a socio-technical infrastructure to support disaster-resilient communities across the preparedness, response, and recovery phases. Building on prior work on citizen engagement and wildfire reporting (Gatial et al., 2024), the system integrates three complementary design pillars: (1) disruption-tolerant communication under intermittent connectivity, (2) community-centered multi-hazard configurability, and (3) structured bidirectional coordination between citizens and first responders. Together, these components operationalize whole-of-society resilience (UNDRR, 2019) by transforming mobile reporting into coordinated, validated action.

Disruption-Tolerant Communication

Crisis informatics research conceptualizes citizens as distributed "human sensors" contributing critical situational data during emergencies (Palen et al., 2010; Romano et al., 2016). However, such participation often implicitly assumes a stable communication infrastructure. Field exercises within the SILVANUS project demonstrated that simulated wildfire scenarios frequently occurred in remote areas with unstable or absent mobile connectivity – confirming that network reliability cannot be assumed under crisis conditions (Bailis & Kingsbury, 2014).

To address this constraint, the SILVANUS App adopts a disruption-tolerant design grounded in structured poll-sourcing and MQTT-based citizen–responder communication protocols (Balogh et al., 2016; Balogh et al., 2023). Reports are locally buffered and transmitted using MQTT with Quality of Service (QoS) guarantees and session persistence. A continuous retry mechanism ensures eventual delivery once connectivity is restored without requiring user re-engagement, thereby reducing cognitive load under stress.

To support operational awareness under constrained bandwidth, the system implements adaptive payload staging. When connectivity is weak, a compressed image (≤64 kB) is embedded directly in the MQTT message to provide preliminary situational insight. Full-resolution media are uploaded automatically once bandwidth improves. This prioritizes timeliness and actionability over completeness during the initial reporting phase.

Additionally, a preloaded mobile coverage overlay is integrated into the interactive map interface. By visualizing likely connectivity zones, users can anticipate communication gaps, adjust routes, and strategically submit reports. Combined, QoS-guaranteed persistence, bandwidth-aware transmission, and connectivity-aware navigation position the SILVANUS App as a disruption-tolerant reporting infrastructure aligned with resilience-oriented design principles.

Community-Centered Multi-Hazard Reporting

Initial deployments revealed that a wildfire-centric reporting model constrained long-term engagement, leading users to perceive participation as less meaningful. Even when additional channels (e.g., wildlife sightings, negligence reporting) were added, the system remained administratively configured and domain-bound. This reflects a broader challenge in crisis informatics: fixed reporting taxonomies often lack flexibility to accommodate evolving, locally specific needs (Palen et al., 2010; Pipek et al., 2014).

The enhanced SILVANUS App therefore implements a template-driven channel architecture enabling runtime reconfiguration without application redeployment. Building on structured poll-sourcing approaches (Balogh et al., 2016), reporting templates define data fields, validation constraints, geospatial attributes, media attachments, and priority metadata. Authorized actors can publish or modify templates via managed channels, while the mobile client dynamically renders corresponding input forms. Beyond crisis-time reporting, this configurability is also intended to support everyday relevance and long-term adoption by allowing communities to create and use information channels that reflect locally meaningful topics, seasonal risks, and recurring practical needs rather than only administratively predefined hazard categories.

This architectural decoupling of the interface and hazard taxonomy enables rapid adaptation to multi-hazard contexts – including floods, storms, infrastructure failures, and public health events – without requiring technical updates. Such modularity aligns with earlier dynamic emergency management systems emphasizing adaptability and interoperability (Turoff et al., 2004).

From a social-science and humanities perspective, template-driven configurability supports inclusivity and cultural adaptability by allowing locally meaningful categories and language framing. Rather than imposing strict global risk definitions, the system accommodates context-sensitive structures. In doing so, the SILVANUS-SK App evolves from a single-risk reporting tool into a scalable communication infrastructure supporting preparedness, response, and recovery in line with whole-of-society governance (UNDRR, 2019).

Volunteer Coordination and Citizen–Responder Mutual Aid

While reporting enhances situational awareness, resilience also depends on how spontaneous volunteers, volunteer firefighters, and other community members can be integrated into coordinated action. Crisis communication research distinguishes between one-way authority-to-citizen messaging and bidirectional interaction models that integrate citizen contributions into operational workflows (Reuter & Kaufhold, 2023). Moreover, research on digital volunteerism highlights both the value and coordination challenges of spontaneous civic engagement (Reuter et al., 2013).

The updated mobile application takes advantage of the configurable, structured format of forms and templates within the same communication infrastructure. For different domains, the users are allowed to:

- Report hazards and provide local observations,
- Request assistance (e.g., equipment such as water pumps during floods or transport support), and
- Offer capabilities, including skills, availability, or material resources.

This design acknowledges that community members possess contextual knowledge and tangible assets that can enhance emergency response. Prior research demonstrates that matching requests and offers can accelerate relief coordination (Purohit et al., 2014), yet such matching often relies on social media mining. In contrast, the updated application embeds structured request–offer brokerage directly into a validated communication ecosystem. All inputs are routed to a responder-operated information hub, where triage, validation, prioritization, and assignment occur. Role-based visibility and moderation workflows ensure that contributions are actionable while preventing unstructured convergence that could overwhelm authorities (Reuter et al., 2013). Status feedback mechanisms inform citizens whether their submissions have been received, validated, or resolved – reinforcing perceived efficacy and institutional trust, which are central behavioral drivers of protective and cooperative action (Reynolds & Seeger, 2005).

By integrating reporting, assistance requests, and resource offers within a unified, template-driven, disruption-tolerant platform, the SILVANUS-SK App supports coordinated mutual aid across preparedness, response, and recovery. This perspective is particularly relevant for the present study, which treats the mobile app not only as a reporting channel for citizens, but also as an infrastructure for structured engagement of spontaneous volunteers and volunteer resource providers under responder oversight.

APPROACH TO RECONFIGURABLE MOBILE APPLICATION

This section summarizes the main architectural updates relevant to the revised reporting and coordination

platform. The backend and middleware architecture (shown in Figure 1) was updated to enhance identity management, interoperability, and service integration. The revised design strengthens alignment among the mobile client, middleware services, and the operational dashboard, supporting a more scalable, governance-aware solution.

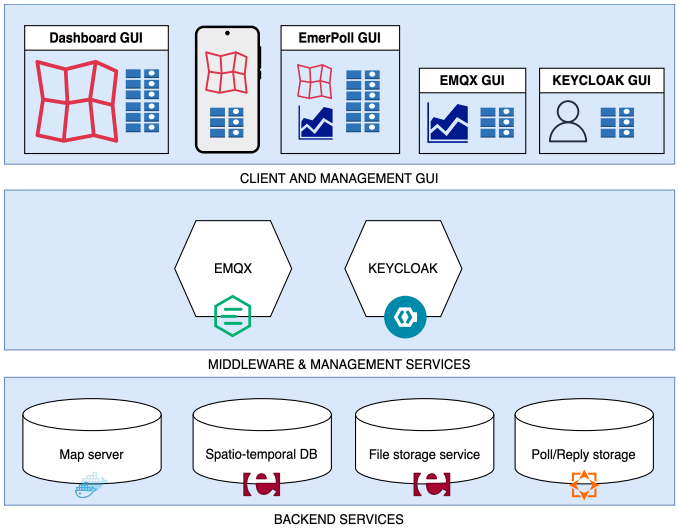

Figure 1. Block schema of the system for hazard reporting and notification.

In the original implementation, user authentication was handled via Firebase Authentication. While suitable for rapid prototyping, this approach imposes limitations regarding federated identity management, institutional integration, and governance flexibility. In the updated architecture, Firebase Authentication was replaced with KeyCloak, an open-source Identity and Access Management (IAM) solution. KeyCloak provides centralized authentication and authorization services, supports the OAuth 2.0 and OpenID Connect protocols, and offers Identity Brokering capabilities. Through identity brokering, users may authenticate using external identity providers (e.g., Google or Facebook), while the system maintains consistent role-based access control within the SILVANUS-SK domain.

The updated application consists of several screens (as shown in Figure 2) that help the user view the current reported hazards. The major improvement in the application is providing live information on the home dashboard, including the news section and the smart hub, which replaces the educational module from the previous version and provides context-based guidelines, FAQs, and quizzes relevant to the user's subscribed information channels. The interactive map also underwent improvements, including multi-channel reporting, information overview by tapping icons on the screen, and the ability to interact with the application via voice commands. To address the potential absence of network connectivity in operational environments, the speech recognition model is preloaded directly on the mobile device and configured to operate in the user's selected language. This on-device design avoids reliance on cloud services, which can be unavailable or inconsistent in remote areas, and supports privacy by keeping audio processing local to the device. Offline voice interaction is facilitated through a constrained set of predefined commands (e.g., insert, mark, move, delete, report, left, right, up, down, send, cancel, back, yes, no), which are recognized by the embedded model and mapped to discrete application actions. Users activate the voice interface via a central microphone button on the map screen, enabling hands-free control when speaking the supported commands.

The Messages screen displays notifications and posts from the information channels the user has subscribed to. Each message item is displayed in a concise list format and can be expanded to reveal full content and contextual details. Additionally, users can navigate directly from a message to the corresponding geographic location on the map, providing a seamless link between textual information and spatial context.

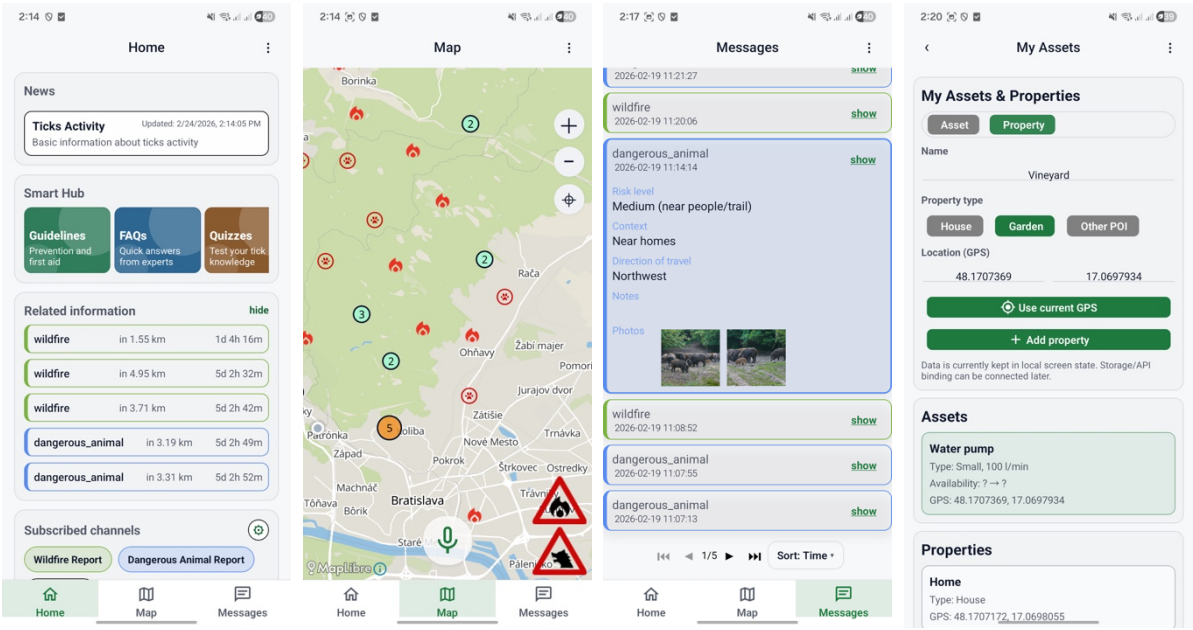

Figure 2. Screenshots of the improved mobile application. From left to right: main dashboard, map screen, messages screen, and assets & offers.

To strengthen disaster resilience at the household and community levels, the SILVANUS-SK App enables users to register and manage geographically anchored properties, as well as the assets they may be willing to share during a crisis. Using these features, the user does not disclose information about the assets or properties to third parties or to an external, potentially untrusted server. This information is used to match events directly on the mobile device, such as warnings and polls, that require resources to notify the user about the relevant events.

Unlike generic alerting applications that rely solely on administrative boundaries, the updated app introduces a property-centric model in which users explicitly define their personal properties. Within the "My Assets & Offers" interface (fourth screen in Figure 2), users can create a new property entry by specifying a semantic label and precise geographic coordinates (latitude and longitude), either manually entered or automatically captured via the device's current GPS position. Instead of broadcasting uniform alerts, the system continuously evaluates proximity between detected or reported hazards and the user-registered properties. When a threat (e.g., wildfire perimeter, flood alert, or other incident) intersects a predefined spatial threshold around a registered property, the application generates a targeted warning notification.

The updated application also supports active contributors by allowing them to register their personal assets and offer them for voluntary support or compensated assistance during ongoing or past crises. This functionality is intended to facilitate the creation of a registry of geographically localized, potentially accessible resources, including physical tools or equipment, as well as volunteer personnel with relevant skills or local contextual knowledge. Such contributions may take the form of lending readily available tools in the vicinity, offering volunteer support for specific tasks, or providing valuable local information on terrain, infrastructure, and hazard-affected areas. Structuring these offerings with explicit spatial and temporal metadata enables the system to integrate community-generated capacities into request-handling and responder-coordination processes, aligning with broader goals of mutual aid and resilience-oriented crisis governance.

EVALUATION

Although the redesigned SILVANUS-SK App builds on a previously deployed system, the present paper reports an ongoing redesign whose dedicated evaluation is still under development and testing. The redesigned SILVANUS-SK App has not yet been evaluated through a full field deployment. To assess the redesigned application, we plan a usability-focused evaluation using session analytics powered by OpenReplay and a closed volunteer user group. As shown in Figure 3, OpenReplay captures complete user sessions – including screen transitions, tap and gesture sequences, network requests, console logs, and performance metrics – enabling developers to reconstruct user journeys visually and technically without relying solely on self-reporting or traditional logs.

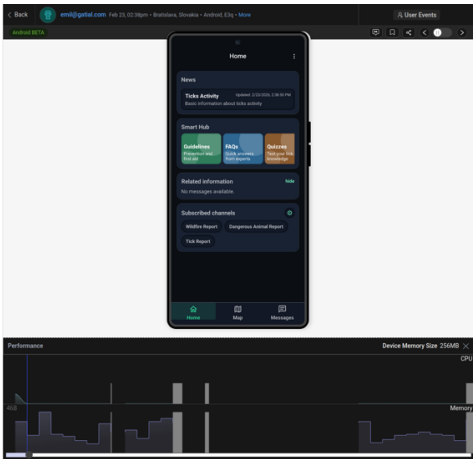

Figure 3. OpenReplay frontend for user activity analysis.

By treating sessions as a sequence of events with synchronized technical context, developers can identify usability bottlenecks, pinpoint interface friction, and observe unexpected navigation patterns that may not be evident from quantitative analytics alone. For these evaluations, a closed volunteer user group will be used, and the final released application will not be affected by session capture.

FUTURE WORK AND CHALLENGES

A key technical challenge for advancing the SILVANUS-SK platform is developing a dynamic taxonomy of user-offered assets that can adapt to evolving poll definitions and heterogeneous resource types. The work (Purohit et al., 2014) shows that effective classification and matching of requests and offers requires well-structured semantics and metadata rather than free-text descriptions alone, due to imbalances and ambiguities in resource categories. An extensible asset taxonomy will improve poll efficiency and enable automated filtering and prioritization based on resource characteristics. Moreover, polling a resource via EmerPoll (Balogh et al., 2023) creates a user's offer that becomes obligatory after the poll ends; therefore, the calendar or reserved resource must be kept up to date with the external EmerPoll service.

Aside from technical challenges, ensuring the credibility and timeliness of user-generated information remains very important, as unreliable or outdated inputs can undermine collective situational awareness and decision support. In the current application, preliminary measures to enhance credibility include user email verification and user ratings for reported content. Planned improvements include photo-based verification mechanisms and conducting further research into mechanisms that enhance both the credibility and timeliness of user contributions.

Improving voice command interpretation remains an important challenge for enhancing user experience. To date, only a limited set of predefined commands is supported, and extending this capability to more comprehensive voice interaction will require further research and development to improve recognition accuracy and semantic understanding across diverse mobile contexts (e.g., background noise, varied speech patterns). To date, preliminary experiments have been conducted with Slovak and English voice recognition models to assess baseline performance and feasibility across multiple languages.

Beyond these technical issues, the practical use of such an application depends on organizational and social conditions that extend beyond interface design alone. The value of citizen reports, volunteer offers, and community-generated information depends on whether responders can validate, triage, and integrate these inputs into operational workflows. Without clear governance, role definitions, and moderation procedures, features intended to support mutual aid may also introduce noise, duplicate effort, or unrealistic expectations among users. This challenge is addressed in part through configurable, on-demand information channels that allow end users to engage with topics relevant not only in crisis situations but also in their daily local context. At the same time, this flexibility raises further practical questions: who can create channels, how they are moderated, how overlapping or low-quality channels are managed, and how responder attention can be preserved for actionable information. Some users may also be reluctant to share location or resource information, and mobile app interaction may remain less accessible to digitally vulnerable groups. These issues should therefore be treated as socio-technical design constraints rather than merely implementation details.

Finally, the redesigned SILVANUS-SK App requires dedicated evaluation in practice. Ongoing and future studies will focus on usability, adoption, and the extent to which citizen and volunteer contributions can be meaningfully incorporated into real crisis coordination processes. By combining technical refinement with evaluation of

governance, trust, and practical integration, future work will help determine the application's long-term value for disaster-resilient communities.

CONCLUSION

This paper presented an iterative redesign of the earlier SILVANUS App into the SILVANUS-SK App, informed by related research, field demonstrations of the original system, and feedback from practitioners. The redesigned application extends wildfire reporting toward a broader, resilience-oriented mobile platform that supports multi-hazard reporting, proximity-based alerting, and structured coordination of assistance requests and capability offers from citizens, spontaneous volunteers, and volunteer firefighters. In this way, the work contributes not only a technical enhancement of an existing app, but also a design-oriented approach to integrating community-generated information and volunteer-supported mutual aid into responder-mediated workflows. Because the redesigned SILVANUS-SK App is still undergoing dedicated evaluation, this paper positions the contribution as work in progress. Future evaluations will assess usability, adoption, and the practical integration of citizen and volunteer contributions into real crisis coordination processes.

ACKNOWLEDGMENTS

This work was supported by the project SILVANUS-SK (project No. 09I01-03-V04-00107), funded by the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia. During the preparation of this manuscript, the authors used ChatGPT 5.2 (OpenAI) to assist with rephrasing and improving the clarity and flow of selected text. All AI-generated suggestions were reviewed, edited, and validated by the authors, who assume full responsibility for the final content and its scientific integrity.

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