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ARTICLE

iWILL+VISER: A Blueprint for a Decision-Making Support System for Individuals and Emergency Agencies

iWILL+VISER: Un Plano para un Sistema de Apoyo a la Toma de Decisiones para Individuos y Agencias de Emergencia

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Abstract

In the aftermath of Hurricane Maria in 2017, Puerto Rico's vulnerability to catastrophic events highlighted the need for better preparedness and decision-making. This experience motivated the development of iWILL (Individual Wellness Inventory Level Log), a mobile application to help individuals make sound decisions during and after an emergency of such nature. The app enabled a user to: (i) monitor their wellness levels, (ii) account for loss of wellness in detrimental events and wellness gains through restorative actions, and (iii) consider three simple courses of action to follow in response to a detrimental event. Beyond the initial capabilities, it was clear that iWILL could help gather aggregated emergency information and transmit it to an information compiler to help emergency agencies allocate resources in a more precise manner. This second component was called VISER (Visual Information System for Emergencies and Resources), an online platform that offered reports of sets of iWILL users who shared information during and after a hurricane. Such integration creates a semi-dynamic feedback loop, between almost real-time challenges and precise resource allocation. The combination of iWILL+VISER holds promise as a potential tool to enhance community resilience and response efficiency during disasters in Puerto Rico.

Index terms: emergency management, decision-making, disaster relief, response efficiency, VISER, wellness level.

Resumen

Tras el paso del huracán María en 2017, la vulnerabilidad de Puerto Rico a eventos catastróficos destacó la necesidad de mejorar la preparación y la toma de decisiones informadas. Esta experiencia motivó el desarrollo de iWILL (por sus siglas en inglés, Individual Wellness Inventory Level Log), una aplicación móvil diseñada para ayudar a las personas a tomar decisiones acertadas durante y después de una emergencia de este tipo. La aplicación permitía al usuario: (i) monitorear sus niveles de bienestar, (ii) registrar la pérdida de bienestar durante eventos perjudiciales y las ganancias de bienestar a través de acciones restaurativas, y (iii) considerar tres cursos de acción sencillos en respuesta a estos eventos. Más allá de las capacidades iniciales, se identificó que iWILL podría facilitar la recopilación de información agregada sobre emergencias y transmitirla a un compilador de datos para ayudar a las agencias de emergencia a asignar recursos de manera más eficiente. Este segundo componente se llamó VISER (por sus siglas en inglés, Visual Information System for Emergencies and Resources), una plataforma en línea que ofrecía reportes de conjuntos de usuarios de iWILL que compartían información durante y después de un huracán. Tal integración crea un ciclo de retroalimentación semi-dinámico, que favorece que la asistencia se dirija a los usuarios según sus desafíos únicos en casi tiempo real. La combinación de iWILL+VISER promete ser una herramienta potencial para mejorar la resiliencia comunitaria y la eficiencia de la respuesta durante desastres en Puerto Rico.

Palabras clave: manejo de emergencias, toma de decisiones, ayuda en desastres, eficiencia de respuesta, VISER, bienestar.

I. Introduction

On September 20th, 2017, Hurricane María devastated Puerto Rico, leading to significant challenges such as widespread shortages of food, water, supplies, and prolonged power outages [1]. The aftermath saw many residents displaced, seeking refuge in shelters, or relocating from the island [2]. The difficulties were intensified by the complex nature of decision-making in critical situations, where the right choices could mean the difference between safety and peril [3]. Moreover, while some citizens received vital assistance from the military and other relief agencies delivering essential supplies to homes or designated meeting points, a significant number remained uninformed or unable to access these crucial aids [4].

In response to this multifaceted challenge, the VISER (Visual Information System for Emergencies and Resources) project was conceived as a potential aid. By integrating the iWILL (Individual Wellness Inventory Level Log) application [6] and the VISER website, this report provides a blueprint on how to supply emergency agencies with real-time data on the number of individuals requiring critical resources, along with their general location. This information would enable the efficient allocation of resources, ensuring that the right kind of help needed per region can be delivered as soon as the opportunity becomes viable, without having to wait on the phone for hours to file a claim [5]. In essence, iWILL+VISER, at this conceptual stage, not only aims to facilitate the efficient allocation of resources but also works to enhance the decision-making capacity of individuals in crisis. This dual focus is expected to contribute to a more resilient and effective disaster relief framework for Puerto Rico.

II. iWILL

The iWILL app was envisioned as a critical decision-making tool during crises, aimed at aiding individuals in making informed choices amidst and following the impact of natural disasters. The application can be accessible both online and offline, allowing users to input their current situation, and receive personalized recommendations for actions to take. Following the selected decision, the app will calculate the individual's well-being and transmit this data to VISER. For privacy reasons, iWILL's development included an option to decide whether the user permits the application to share the information collected to aiding agencies via VISER. Fig. 1 depicts several images from the iWILL interface.

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ig. 1. iWILL Application and Features: (a) iWILL Home Page, (b) Main Menu Page, (c) Map, (d) Emergency Contact Page, (e, f) Status Report Page, and (g) Make an Announcement Page [6].

The wellness level in iWILL aimed to maximize inventory levels while considering both detrimental effects, which diminish an individual's well-being, and restorative actions aimed at resolving the detrimental situation and enhancing wellness [6]. An illustration of the calculation method is shown in Fig. 2[6].

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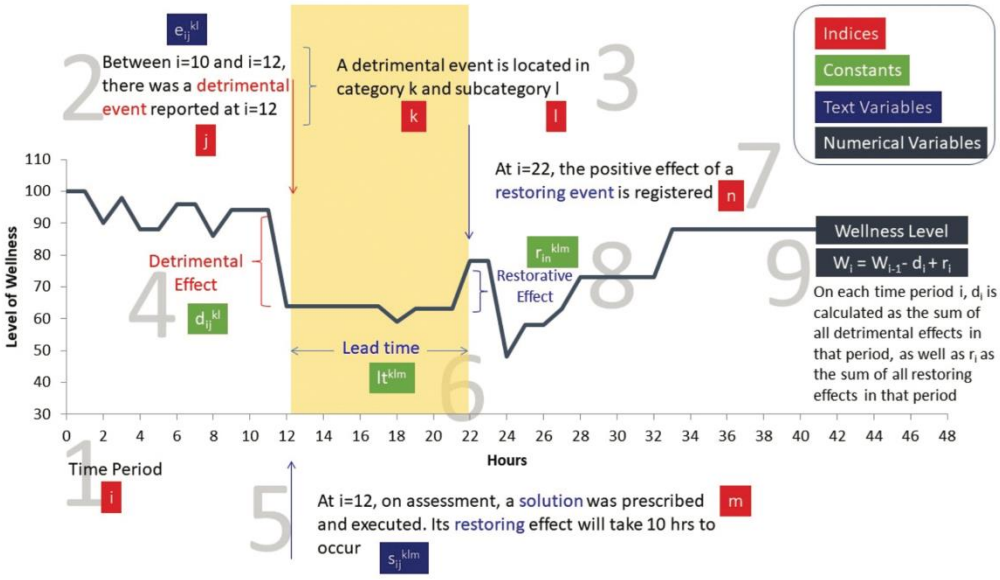

Fig. 2. Principal elements of a wellness model [6].

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Following the paper Individual response and recovery: A learning experience from Hurricane María [6]: "This work proposes that an individual's level of wellness during a hurricane can be seen as an inventory to be maximized. Classical inventory control models are used in manufacturing to maintain a level of inventory that minimizes production costs while meeting production demand. Using this framework for the problem at hand, a detrimental event (e.g., losing a window in your place of shelter) carries a reduction on an individual's well-being, while working on restorative action (i.e., a solution) would carry the opposite effect. A wellness monitoring system during hurricane emergencies was envisioned so that this model could query individuals periodically—every 2 hours, for instance—to register events that occurred since the last time of query and reflect individuals' live wellness levels. Once events were reported, the system would provide simple solutions in a prescriptive manner to help mitigate detrimental effects and restore the wellness level in the near future."

The purpose of integrating iWILL and VISER is for the emergency agencies be able to gather aggregated information from multiple users during emergencies to assess the kind and amounts of resources needed in different geographical areas.

III. VISER

It is important to understand the distinction between the two systems, iWILL and VISER, to appreciate the scope of this idea. iWILL is a mobile phone-based app that helps each person report an emergency that occurs during and after a natural disaster. At the same time, it could work as an information channel so that emergency agencies can find out the emergencies that occur after the event. VISER, on the other hand, is a webpage where emergency agencies can go to monitor the emergencies reported by users.

Poor preparation and decision-making by residents and emergency agencies during and after Hurricane Maria was a key observation to this idea. People who benefit from the iWILL app may make better decisions; while emergency agencies can benefit from VISER to better plan resources and be more effective in delivering them to residents, helping to improve the effectiveness of their services, perhaps even in longer terms. A year after the hurricane, a quarter of Puerto Ricans reported that their lives remained disrupted, with 26% experiencing post-traumatic stress and facing financial difficulties [2]. One study even found that 7.2% of students reported "clinically significant" symptoms of PTSD [8]. Unfortunately, "stress neurophysiologically affects the ability to make decisions effectively", which could make a difference in these situations [3]. The idea is to provide emergency agencies, such as FEMA and AEMEAD, and support organizations with access to VISER so that they can also better plan their resources allocation.

IV. Materials/Methods

Methodology: In January 2021 a group of 540 individuals completed the survey: Individual Response and Recovery: A Learning Experience from Hurricane María [6]. The purpose of the survey was to collect information of the individuals' actions and decision-making before, during, and after Hurricane María in 2017 [7]. Questions covered aspects like preparation, primary source of information, mental and physical health, family/friends' health, pets, and more. The results led to the analysis of the respondents' wellness.

The proposed methodology for aiding individuals during emergencies involved the development of the iWILL application using the Power Apps platform. The process included making the application available to emergency agencies and users. Users would access the app to report emergencies or seek guidance. The user-generated reports are then transferred to Excel Online on a cloud platform. In the Power Apps settings, the format for output should be changed in connections, and the Excel document must be on the cloud. Later, the Excel link is passed on to Power BI. Finally, Power BI will pass all the information to the online website called VISER, created in WIX platform, which makes responses available to agencies

For example, FEMA makes the decision to help people who live in Puerto Rico after a storm warning for the Island. After the storm, the agency assigns Joseph, one of the FEMA agents, to monitor the emergencies that occur in the southwest area of Puerto Rico. Joseph decides to enter the VISER platform to learn about the events reported by people in this region. Fig. 3 presents the steps that Joseph used to learn the emergencies reported in the southwest region.

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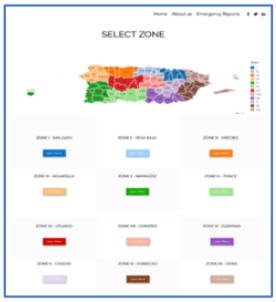

1. *Joseph enters to VISER platform.*
2. *The VISER Platform has a menu with three sections: Home, About Us and Emergency Reports. To see the reports, Joseph chooses Emergency Report section.*
3. *Then, the website requests a password to access to the report.*
4. *After the access, Joseph selects the zone of interest. In this case, he selected Zone V – Mayagüez.*
5. *Finally, VISER presents the report of emergencies by the people who live in the Southwest Area. The report contains two pages. The first page presents the collective wellness level of people that live in the cities located in southwest area. It also presents a statistical summary of wellness level of people by cities.*

The second page presents graphs that show the events reported by cities and the solutions that people chose. Also, it presents the statistical summaries of the events reported by cities. With this information, Joseph can create a plan to help the people with a critical wellness level and the cities with most events reported, allocating better the resources. In the case of Aria, Joseph can call the agents to help to clean the blocked road in Mayagüez.

Fig. 3. Schematic of the dynamics between iWILL and VISER from an emergency agency point of view.

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Materials: Power Apps [9], Excel Online [10], Power BI [11], and WIX [12] are the key to the function of iWILL and VISER (see Fig. 4). The iWILL app prototype was developed on the Power Apps Platform. The information obtained by this app will be stored in Excel Online. The VISER prototype was created on the WIX Platform. The reports generated by VISER would be automatically created in Power Apps, utilizing the information stored in Excel Online.

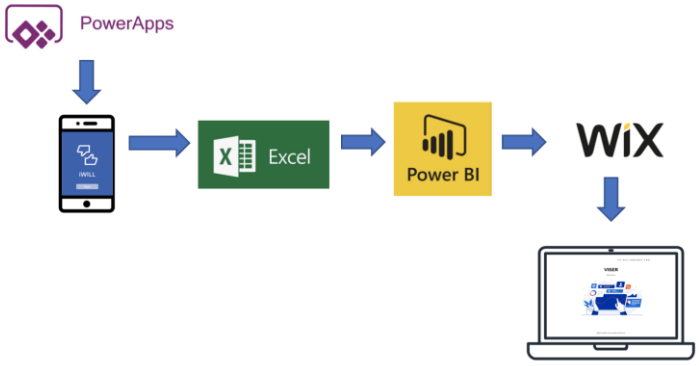

Fig. 4. Information Flow between iWILL and VISER.

The proposed connection between iWILL and VISER through Power BI aims to establish seamless collaboration. In its prototype, the VISER platform comprises various sections accessible to the public, including Home, About Us, and Emergency Reports. Fig. 5 and Fig. 6 offer a glimpse into the Homepage and About Us sections, respectively, providing insight into VISER's mission and the dedicated individuals behind it. Notably, the Emergency Reports section, vital for comprehensive disaster management, requires a password for access. Fig. 7 illustrates the prompt users encounter when attempting to enter this protected section.

V. Preliminary Results and Discussions

Gravimetric results showed that the wear rate decreases with increasing temperature, moreover slight increase in hardness was observed on the surface of the specimens as the temperature increases in the tests. This behavior is attributed to the softening of stainless steel at high temperatures, which promotes plastic deformation and reduces material removal.

Fig. 5. Homepage of Viser [13].

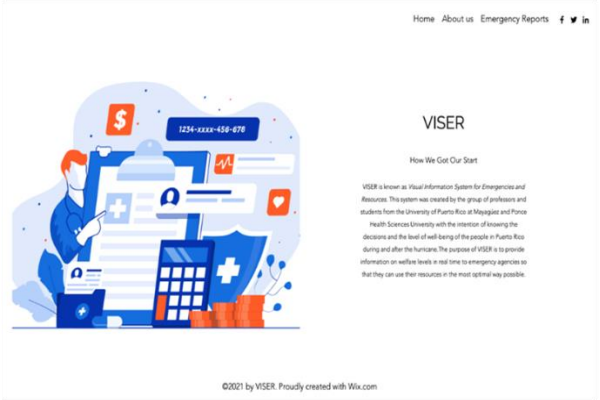

Fig. 6. About Us section [14].

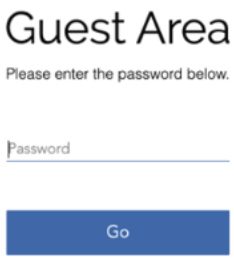

Fig. 7. Password request page to Emergency Report section.

Within Emergency Reports, users will select one of twelve emergency management zones on the island (See Fig. 8). The idea of zone divisions was inspired by Puerto Rico State Agency for Emergency and Disaster Management (AEMEAD) contact map (See Fig. 9). The purpose of dividing it per zone is to present a report about the events and solutions during and after a hurricane reported by the iWILL application.

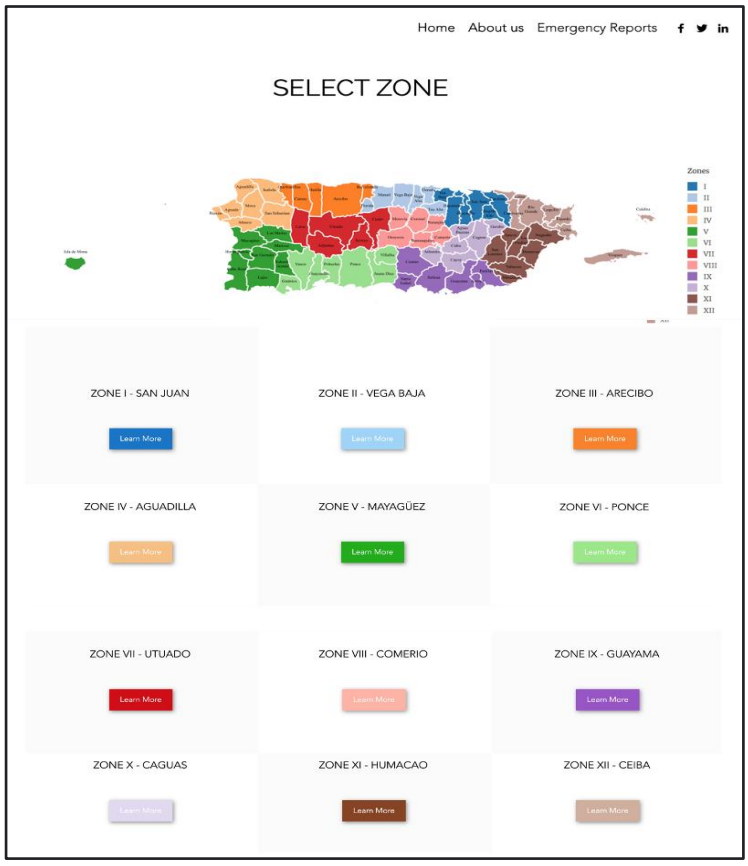

Fig. 8. Emergency Report section.

Fig. 9. Puerto Rico State Agency for Emergency and Disaster Management Contact Map [15].

Although data directly from the iWILL app is not currently available, a Power BI demo report provides a visual representation of how official reports may appear (see Fig. 10 and Fig. 11). This demo utilizes extracted data from Microsoft Excel expecting this to be a representation of the connection to iWILL. Showcased on Fig. 10 is a map of reported events and the well-being levels of users during and after Hurricane María, complemented by boxplots illustrating well-being variations across different towns. Additionally, Fig. 11 features a pie chart displaying the number of reported events, a histogram outlining reported solutions, and a descriptive statistical summary of well-being levels in each town. This structured approach to data presentation aids in comprehending the impact of events, fostering efficient response strategies and community resilience. These visualizations and data representations are part of the conceptual stage, with no operational system in place.

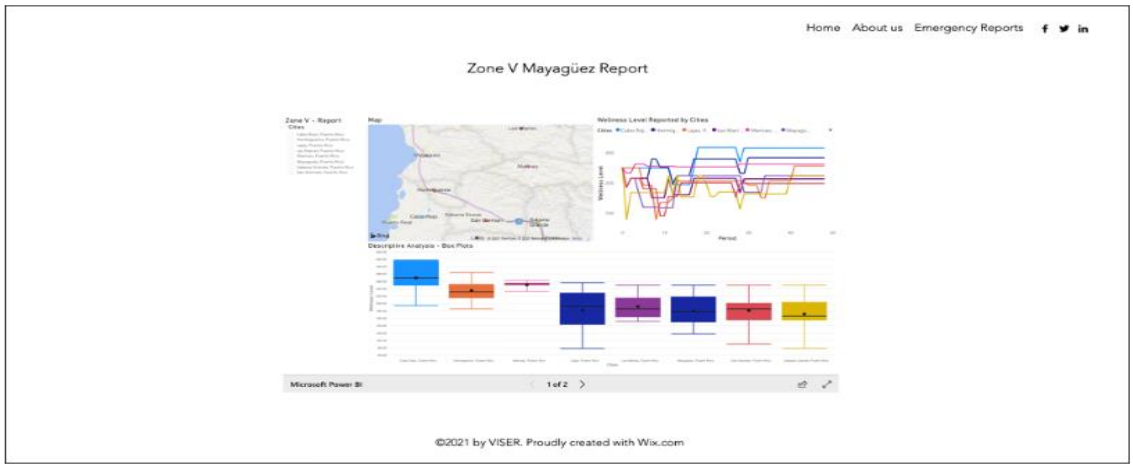

Fig. 10. Demo map of reported events and the well-being levels of users during and after Hurricane María.

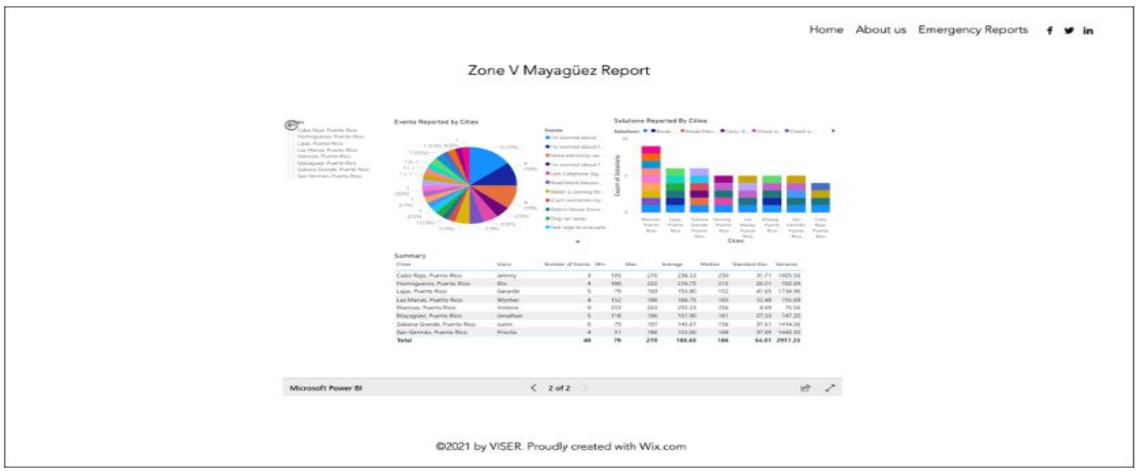

Fig. 11. Demo statistical reports of well-being levels in each town.

VI. Potential Expansion

As part of a potential expansion plan, a concise system could be integrated into the iWILL app, allowing essential business owners to submit relevant information regarding available and required inventory before, during, and after a natural disaster. By partnering with local businesses and relevant authorities, iWILL would ensure that users can quickly access critical services closest to them, saving valuable time during emergencies —where moments could mean the difference between safety and danger. This collaboration would also enable real-time updates on resource availability, ensuring a seamless experience for users when they need it most. Table 1 shows examples of businesses and how they can assist the community through the data compiled in VISER.

Table 1
Proposed Approach

Business	Method
Supermarket	Supermarket owners will be able to access the platform to share information about the remaining inventory of essential items (e.g., bottled water, canned food, batteries, among others).
Gas station	Gas station owners will be able to provide immediate updates on their remaining gasoline reserves. This would help reduce long lines of citizens seeking gasoline for generators and enable them to locate the nearest available gas station.
Pharmacy	Pharmacy owners will be able to provide information on perishable medications (e.g., insulin), allowing citizens experiencing power outages to find the nearest pharmacy with the required medication, thereby reducing the time spent searching for these necessities.

VII. Environmental health settings: another possibility

An integration such as described here can be used for educational or training purposes, academic programs focused on public health or emergency management, as well as local and governmental agencies responsible for providing aid during these times. The offline version capabilities of the app would be highly valuable. During extreme weather events, power outages, and unstable internet connections can disrupt information sharing between different agencies. The ability to collect data offline reduces the risk of information being lost during online entry, ensures communities with limited connectivity are not excluded from representation, and local storage of information until synchronization becomes possible can help protect sensitive information. Providing access to this technology to students would create valuable on-the-ground experiences. Students can assist as data collectors during shelter assessments or community evaluations while helping to address workforce shortages. This approach supports collecting real-time situational conditions, data that can improve public health interventions, enhance surveillance systems, reduce risk inaccuracies associated with outdated information, and ultimately contribute to more reliable systems.

A more robust implementation of the platform, such as integrating real-time environmental data streams into the iWILL and VISER system, would significantly strengthen public health response during and after extreme weather events. By pairing user-submitted information from iWILL with live environmental monitoring data—such as air quality indices, flood gauge readings, storm tracking, and water contamination alerts—public health agencies could obtain a layered, geographical view of risk. Through VISER, agencies responsible for emergency response would be able to visualize both citizen-reported emergencies and environmental hazard indicators in a single dashboard. This integration would allow officials to identify emerging hotspots, prioritize areas with compounded risks, and deploy resources proactively to protect vulnerable populations such as children, the elderly, and individuals with chronic health conditions. In addition, implementing exposure assessment and risk prioritization within iWILL would enhance early detection of health risks. When users report specific hazards such as flooding, chemical odors, or infrastructure damage, the app could trigger structured follow-up questions to assess potential exposures, including contaminated drinking water, sewage backup, or injury. These responses could be analyzed using a simple risk-scoring algorithm that flags high-priority cases for immediate review on VISER. This approach would enable public health agencies to conduct a needs assessment remotely, allocate limited response teams more efficiently, and mitigate health impacts before they escalate into larger outbreaks or environmental health crises.

VIII. Conclusion and futures work

This work highlights the proposed integration between the iWILL App and VISER platforms. The transition of iWILL from internal storage to an external source like Microsoft Excel Online enables the sharing of application results externally. This implementation should allow agencies to access statistical analyses of areas most impacted and in need of assistance. The integration of Google Maps stands out as a pivotal addition to iWILL, enhancing its ability to pinpoint users' approximate locations and effectively allocate resources within the community. These features hold promise in improving response efforts during critical situations.

Looking ahead, future enhancements to iWILL are poised to include the integration of social media. For instance, incorporating social platforms into the "Make an Announcement" feature can extend the reach to individuals beyond immediate geographic locations, fostering a broader sense of community support and collaboration [18]. Moreover, upcoming steps involve conducting real-world tests of the application to observe actual data flowing through the VISER process. This practical approach will enable the collection of authentic case data, refining the system's responsiveness and adaptability to diverse disaster scenarios. By bridging technological innovation with community engagement, iWILL+VISER aim to create a resilient framework that not only responds effectively to disasters but also promotes proactive collaboration and resource allocation for a more prepared and connected society.

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CRediT (*Contributor Roles Taxonomy*)

Author Contributions: Conceptualization: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**; Methodology: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**; Investigation: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**; Writing-original draft preparation: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**; Writing-review and editing: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**; Supervision: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**; Formal analysis: **JN**, **HP**, **AB**, **WR**, **VD**, **MC**, **CEI**.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

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REFERENCIAS

[1] "Hurricane Maria," CNN. [Online]. Available: https://edition.cnn.com/specials/weather/hurricane-maria

[2] Estudios Técnicos Inc., "Estudio post huracán María de Estudios Técnicos, Inc. se destaca en prestigiosa convención de investigadores," Perspectivas, vol. 26, no. 5, May 2019. [Online]. Available: https://www.estudiostecnicos.com/pdf/perspectivas/2019/mayo2019.pdf

[3] L. P. Cote-Rangel, A. M. García-Becerra, "Estrés como factor limitante en el proceso de toma de decisiones: una revisión desde las diferencias de género," *Av. Psicol. Latinoam.*, vol. 34, no. 1, pp. 19–28, Jan. 2016, doi: https://doi.org/10.12804/apl34.1.2016.02

[4] L. M. Quintero, "El Inspector General de Estados Unidos confirma mal manejo de FEMA tras el huracán María," *El Nuevo Día*, Sep. 20, 2020. [Online]. Available: https://www.elnuevodia.com/noticias/gobierno/notas/el-inspector-general-de-estados-unidos-confirma-mal-manejo-de-fema-tras-el-huracan-maria/

[5] "Teléfonos de emergencia ante desastres naturales," El Nuevo Día, 2017. [Online]. Available: https://huracanmaria.elnuevodia.com/2017/ayudas/telefonos/

[6] V. Díaz-Pacheco, et al., "Individual response and recovery: A learning experience from Hurricane María," *J. Emerg. Manag.*, vol. 19, no. 8, 2021, doi: https://doi.org/10.5055/jem.0548 [wmpllc.org]

[7] D. A. Farber, "Response and recovery after Maria: Lessons for disaster law and policy," *Rev. Jur. Univ. P. R.*, vol. 87, no. 3, pp. 743–771, 2018. [Online]. Available: https://derecho.uprrp.edu/revistajuridica/wp-content/uploads/sites/4/2018/06/04-Disaster-law-and-policy-1.pdf [derecho.uprrp.edu]

[8] C. Heredia Rodríguez, "El legado de María: estudiantes en Puerto Rico sufren de estrés post traumático," Kaiser Family Foundation, Apr. 26, 2019. [Online]. Available: https://khn.org/news/el-legado-de-maria-estudiantes-en-puerto-rico-sufren-de-estres-post-traumatico/

[9] Microsoft, "Power Apps," 2024. [Online]. Available: https://www.microsoft.com/en-us/power-platform/products/power-apps

[10] Microsoft, "Excel Online," 2024. [Online]. Available: https://www.microsoft.com/es/microsoft-365/excel?market=pr

[11] Microsoft, "Power BI," 2024. [Online]. Available: https://www.microsoft.com/en-us/power-platform/products/power-bi

[12] "WIX website builder," 2024. [Online]. Available: https://www.wix.com/

[13] D. Vujic, "Analysis, data, database illustration," Iconfinder. [Online]. Available: https://www.iconfinder.com/icons/5206309/analysis_data_database_document_format_sheet_icon
[14] D. Vujic, "Health, insurance, medicine illustration," Iconfinder. [Online]. Available: https://www.iconfinder.com/icons/5206318/health_insurance_medicine_protection_safe_security_icon
[15] "Manejo de Emergencias," Gobierno de Puerto Rico. [Online]. Available: https://manejodeemergencias.pr.gov/
[16] DHS, "FEMA's longstanding IT deficiencies hindered 2017 response and recovery operations," Department of Homeland Security, Aug. 27, 2019. [Online]. Available: https://www.oig.dhs.gov/sites/default/files/assets/2019-08/OIG-19-58-Aug19.pdf [Accessed: Jun. 3, 2026].
[17] J. Rivera, "A content analysis on the phases of emergency management for Hurricane Maria in Puerto Rico," Pegasus Rev.: UCF Undergrad. Res. J., vol. 11, no. 1, pp. 1–7, 2019. [Online]. Available: https://stars.library.ucf.edu/urj/vol11/iss1/2/
[18] A. Mangones, "Social media in disasters," PrepareCenter, Jan. 7, 2015. [Online]. Available: https://preparecenter.org/topic/social-media-disasters/

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