From Awareness to Action: Empowering Communities through Disaster Risk Reduction Education

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1 Project Scenario

Introducing "CommunityShield Academy", is a special project that creates a web application to make Bangladesh safer during cyclones and other disasters. It uses smart computer skills to provide real-time weather updates, show safe escape routes, and give emergency contact numbers. The web application also connects volunteers and organizations with people who need help during disasters. It teaches everyone how to get ready for emergencies through fun videos and interactive activities.

The project is led by clever software engineers who work together to make the web application effective and user-friendly. They use advanced technologies to give accurate weather forecasts and helpful information to keep people safe. The web application acts as a hub, bringing together volunteers and organizations to work as a team and provide support during emergencies. The project also focuses on teaching people about different types of disasters and how to prepare for them. The web application has interactive lessons, quizzes, and localized content that is easy to understand and remember. This way, everyone can learn how to stay safe and be prepared. In Bangladesh, where cyclones and disasters pose threats, "CommunityShield Academy" steps in as a guiding light. Using advanced technology and expert knowledge, it ensures the safety of all citizens. The user-friendly web application offers real-time weather updates, safe escape routes, and emergency contacts.

Through interactive education, "CommunityShield Academy" empowers people to face disasters confidently. With software engineers and disaster experts working together, it strengthens Bangladesh, creating a safer future for everyone. Together, we protect and uplift our nation.

2 Research / Literature Review

In 2018, bignami et al. suggested The #italiasicura platform, promoted by the Italian government and Politecnico di Milano Foundation, aims to increase community social awareness and engagement in natural hazard risk reduction.It provides data on flood and landslide hazards, recent events, damages, emergency management, and public works. The platform and #39;s metrics enable monitoring progress in promoting social awareness and enabling widespread community engagement with disaster risk reduction strategies. Citizens can easily verify if a place is in a flood or landslide-prone area, and the platform may facilitate the dissemination of disaster certifications for buildings.[**2**] This platform consists of three pages: one for mid- and long-term hazards, one for national emergencies, and one for disaster risk mitigation work. The platform uses a spatial interface, with maps associated with a database system.

In 2014, Raman et al. presented a prototype system developed in Malaysia for emergency management, potentially useful in Selangor, a state prone to natural disasters such as flash floods and landslidesThe authors propose a web-based information system to improve disaster management by establishing a clear structure, creating an organizational memory system, and enabling quick information retrieval. They present a comprehensive framework called SAGA, mapping IT to the entire disaster lifecycle. . The architecture comprises three main modules: iCEMAS, a knowledge-information base, a Community Portal, and an Agency Portal. It is supported by integration, reasoning, and packaging layers, using rule-based systems and open source protocols. [**1**]

In 2017, Dorasamy et al. gives a thorough [**3**] discussion about development and testing of a prototype Knowledge Management System (KMS) called Integrated Community Emergency Management and Awareness System (iCEMAS) for emergency management in Malaysia. The iCEMAS prototype consists of two main sub-components, a portal for the community and CEMAS (the dashboard containing database functions, communication tools, and a disaster knowledge bank) . The paper emphasizes the importance of incorporating features that enable role changes and allow people to access changes based on situational requirements. The iCEMAS prototype was developed and tested using a multi-method strategy, and the results showed that it has the potential to revolutionize emergency management in Malaysia. The paper also highlights the need for socio-technical factors to be taken into consideration when developing systems to support emergency management.

In 2017, Lagmay et al. proposed a paper with project NOAH, which is a Philippines government initiative, aims to share critical data with the public to empower community resilience by deploying weather-related sensors, using advanced methods for high-resolution flood and landslide hazard maps, providing accessible, accurate hazards information, and integrating disaster efforts

from government, academia, civil society, and private sectors.The government has funded a survey of the Philippines using LiDAR and radar remote sensing technology to generate high-resolution hazard maps for community preparedness and development planning.Project NOAH uses meteorological data from DOST-PAGASA, DOST-ASTI, DREAM/LiDAR, and ClimateX components to provide real-time hazards information to communities and government units. It promotes frontier science and technology for homeland security, requiring society to embrace and use it wisely.[**4**]

3 Utility Tree

Utility trees are a tool for organizing and evaluating the key factors that contribute to the overall value of a project. To create a utility tree,these simple steps must be followed:

- Start with the root node labeled as "UTILITY" (Level 0).
- Create the second level (Level 1) by listing the quality attributes.
- Under each quality attribute, add refinements as Level 2 nodes.
- Finally, at Level 3, include the ASR Scenarios as the leaves of the utility tree.

Here is a simplified representation of a utility tree for our project:

Quality Attributes	**Attribute Refinements**	**ASR Scenarios**
Performance	Real-time updates	The system must provide real-time weather updates to ensure accurate and up-to-date information. (M,L)
	Low latency	The system has low latency in processing and displaying data to minimize response time.(M,L)
	Scalability	The system is able to handle at least 150 concurrent users during disasters.(H,M)
Usability	Intuitive UI	The user interface is intuitive and easy to navigate for all types of users.(L,L)
	Interactive Content	The system offers interactive videos and activities to engage users in emergency training.(H,H)
Configurability	Customizable Escape	The system allows users to customize escape routes based on their location and preferences.(M,M)
	Personalized Alerts	Users are able to set personalized alerts for specific weather conditions and emergencies.(M,M)
Maintainability	Modular Architecture	The system should be built using a modular architecture to facilitate easier maintenance.(H,M)

Quality Attributes	Attributes Refinement	ASR Scenarios
	Logging and Monitoring	The system must have robust logging and monitoring to detect and address potential issues. (M,L)
Security	Secure Data Storage	The system should store sensitive user data securely to protect privacy and prevent breaches. (H,H)
	Encrypted Communication	All communication between users and the system is encrypted to ensure data integrity. (H,H)
Availability	Redundancy	The system should have redundancy measures to ensure continuous operation during disasters. (H,H)
	Disaster Recovery	The system must have a disaster recovery plan to restore services within 0.5 seconds in case of system failures. (H,M)