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Fishers Buddy - An Android and ODK based Mobile Application for Fishermen Safety

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***Abstract*—** The cyclone Ockhi of the recent past which devastated the fishing community of Tamilnadu and Kerala brought into focus the fact that till date there is no set mechanism to track fishermen stranded in the sea specially during emergencies such as cyclones. Many fishermen were missing and the rescue teams had no information that could be used to track or search for the missing fishermen. Currently the only way of tracking the fishermen in Tamilnadu are the tokens distributed for fuel subsidy to boats registered with the State Government. The precautionary measures the fishermen could take to provide locational information to facilitate tracking during emergencies like cyclone need to be addressed immediately. It is towards this end, the "FISHERS BUDDY" is developed using the Open Data Kit which is an android based multiform data collection tool incorporating form data, GPS tags, photos, videos files etc. The aim of the paper is to present a prototype frame work built using smart phones and available technologies to address fishermen safety and aid rescue efforts during emergencies such as cyclones.

***Keywords*—** cyclone, Android, Open Data kit, mobile application

I. INTRODUCTION

India is prone to tropical cyclones as is evident from the history of the recent past, Laila (2010), Jal (2010), Phalin (2013), Hudhud (2014), Nada (2016) and Ockhi (2017) which destroyed, life and property and left behind a trial of destruction in the coastal states. The term 'Cyclone' is used globally to cover tropical weather systems (World Meteorological Organisation (WMO), 2009), in which winds equal or exceed the minimum of 34 knot (62 kmph). These are intense low pressure systems of the earth atmosphere coupled system and are extreme weather events of the tropics. Tropical cylcones (TC) are known by many names the world over like cyclones, typhoons, hurricanes, etc. Though they vary by name across regions, they are classified according to associated maximum sustained surface wind speed (MSW). The classification, however, varies from region to region.. The low pressure systems with intensity of depression and above are known as cyclonic disturbances. India has a coastline of about 7516 km of which 5400 km is along the mainland. The entire coast is affected by TCs with varying frequency and intensity. Although the North Indian Ocean (the Bay of Bengal and Arabian Sea) generates only about 7% of the world's TCs but their impact is comparatively high and devastating, especially when they strike the coasts bordering the North Bay of Bengal. Thirteen coastal states and Union Territories (UTs) in the country are affected by TCs. Four states (Tamil Nadu, Andhra Pradesh, Odisha and West Bengal) and one UT (Puducherry) on the east coast and one state (Gujarat) on the west coast are more vulnerable to TC hazards. The cyclone hazard prone states of India are shown in Fig.1.

Fig.1 Cyclone hazard prone districts of India (Source : IMD)

Indian Meteorological Department (IMD) issues cyclone warnings and alerts well in advance and there has been large reduction in loss of life due to the early warning. However cyclone OCKI brought out a problem that was not properly addressed till date. Ockhi emerged from the Bay of Bengal in late November and by December 6 had swept west across Tamil Nadu, Kerala and Lakshadweep islands before dissipating over the Arabian Sea. Hundreds of fishermen in mostly rudimentary boats were caught in unawares and went missing.

II. PROBLEM STATEMENT AND OBJECTIVE

There is a major need to address this problem since till date there is no set mechanism to track fishermen stranded in the sea. The lack of any precautionary or preventive measures by the fishermen at the sea could take to seek help or provide locational information to facilitate tracking during high alerts

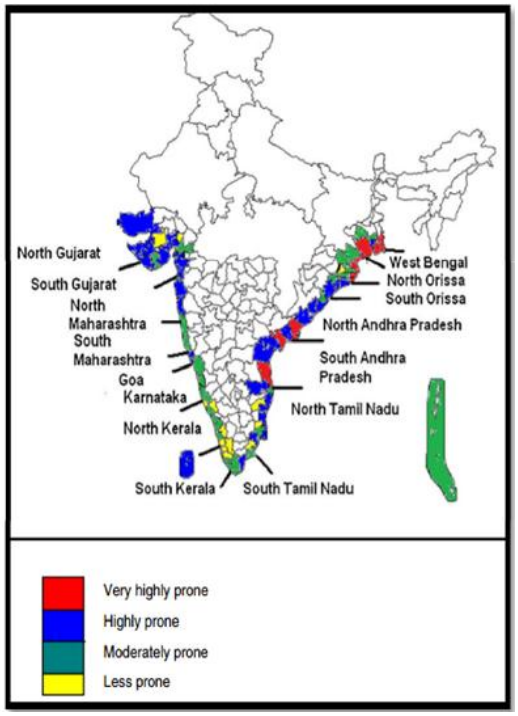

Figure1. Cyclone hazard prone districts of India (Source : IMD)

and emergencies like cyclone Ockhi need to be taken up on priority. Currently the only way of tracking the fishermen at least in Tamil Nadu are the tokens distributed for diesel and kerosene subsidy to boats registered with the state government under the Marine Fishing Regulation Act. This number is tracked by the 31 diesel outlets in fishing harbours and fish landing centres along the Tamil Nadu coast. The precautionary measures the fishermen could take to provide locational information to facilitate tracking during emergencies like cyclone need to be addressed immediately. It is towards this end an android based mobile app "FISHERS BUDDY (FB) " is developed using the Open Data Kit which is an android based multiform data collection tool incorporating form data, GPS tag photos videos files etc. The aim of the paper is to present a prototype frame work built using smart phones and available technologies to address fishermen safety and aid rescue efforts during emergencies such as cyclones.

III. CONCEPT AND ARCHITECTURE

This paper presents Open Data Kit (ODK), an extensible, open-source suite of tools designed to build information services for developing regions. ODK currently provides four tools to this end: Collect, Aggregate, Voice, and Build. Collect is a mobile platform that renders application logic and supports the manipulation of data. Aggregate provides a "click-to-deploy" server that supports data storage and transfer in the "cloud" or on local servers. Voice renders application logic using phone prompts that users respond to with keypad presses. Finally, Build is a application designer that generates the logic used by the tools. Designed to be used together or independently, ODK core tools build on existing open standards and are supported by an open-source community that has contributed additional tools. We describe four deployments that demonstrate how the decisions made in the system architecture of ODK enable services that can both push and pull information in developing regions. The advantages of developing the application using ODK are:

- Modular Components: By focusing on creating small, composable modules, we can create a system that is easier to extend and modify.
- Open Source. By utilizing open source software and interfaces based on open standards we are able to leverage a wider developer base allowing more participation from the community.
- Cutting Edge Technology. Rather than building for a specific hardware platform, we developed our applications on systems that are likely to persist and evolve over the long-term, provide a diversity of available form factors, and adapt to new capabilities made available by the rapid pace of innovation in this space.

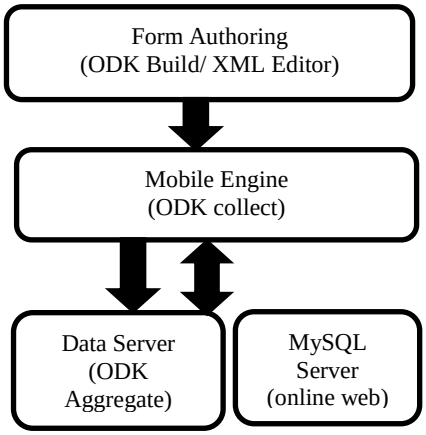

Figure 2. ODK Architecture

This app was built on mobile phones since they are ideally suited for these types of applications primarily because of their small form factor, lower price relative to PCs and laptops, ability to run in disconnected environments with intermittent access to power, and almost universal familiarity amongst our typical users.

IV. METHOD ADOPTED FOR DEVELOPMENT OF FISHERS BUDDY AND TESTING

The two main componenets of ODK are ODK collect and ODK Aggregate. Data collect is a replacement for paper forms and supports geo-locations, images, audios, videos etc. ODK Aggregate is a cloud storage platform that stores the forms and the collected data. Development of the Fishers Buddy app includes (Fig.3).

- Install ODK collect

- Install ODK Aggregate
- Creating survey forms using Build or XLS Form
- Upload forms to an aggregate server
- Load forms into collect on an Android device
- Use collect to fill out forms with participants
- Analyze data in Aggregate

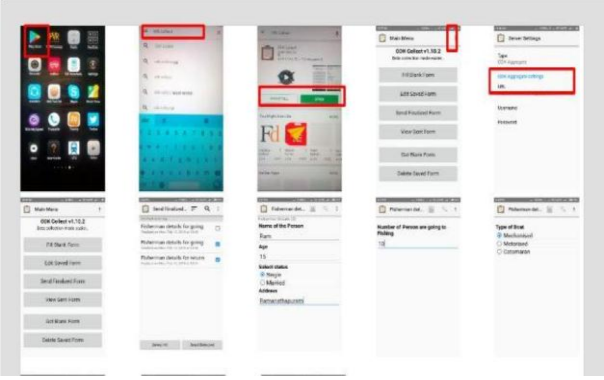

Figure 3. Fisher's Buddy App

Setting up ODK collect and Aggregate: The ODK collect is downloaded from Goggle play store and installed in the android phone while the "ODK aggregate was installed by setting up a new Google cloud project space for the application

Create and upload forms with ODK collect: Survey forms were designed using ODK Build to take in information about the Fisherman and it included name, age, number of people, expected period of stay in sea, date of return, direction etc.

Upload Forms to an Aggregate Server: The forms were designed with all necessary data field and then uploaded in to the Aggregate server

Load Forms into Collect on an Android device: The forms can now be downloaded into multiple devices and be used for collecting information about the fishermen.

Use collect to fillout forms with participants: The app was tested by loading it into a number of phones. The forms were filled; geotagged photos attached and the direction of movement were recorded

Analyse data in Aggregate: Data sent in from all locations will be stored in the cloud which can be downloaded and analysed to study the number of fishermen at sea at any point of time.

V. RESULT AND CONCLUSION

The main advantage of this app is that there will be a centralised database which will have information about the fishermen venturing into sea and by analysing the details in the database their distance from shore, the number of people stranded in case of a calamity can all be calculated using suitable software. Till date such information is stored manually in each village independent of each other and hence consolidation of information for disaster rescue operation becomes a huge task. The fisher's buddy is a small step to ensure better planning and mitigation operation to ensure safety of the fishing community in times of natural calamities.

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