

An app for fishers

The University of the West Indies' multifunctional mFisheries app

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CTA Technical Brief



The project

Project holder The University of the West Indies

<https://sta.uwi.edu/eng/electrical/>
<http://cirp.org.tt/mfisheries/>

Application mFisheries (navigation, SOS, prices, tips, boat tracking)

CTA project Integration of ICT into the Small Scale Fisheries Vertical Value Chain: mFisheries@Sea Delivery Model

Location Trinidad and Tobago

Clients Fishers, coastguard, fisheries cooperatives, ministries responsible for fisheries management

Topic A multifunctional mobile phone app for coastal fishers in the Caribbean

Project description The University of the West Indies redesigned and promoted an app for navigation, emergencies, price information, communication for coastal fishers and fisheries organisations in the Caribbean.

JOEY IS LUCKY to be alive. Pirates boarded his fishing boat in the Gulf of Paria, west of Trinidad, stole the boat and threw him and his crew member overboard. He managed to swim for an hour, the crew member on his back, until he reached a ship, where they clung to the anchor chain. Their cries for help went unheard until early the following morning, when a patrol boat spotted them.

Piracy is just one of the hazards facing small-scale fishers in the Caribbean. Fishers leave home in small boats and try their luck among the waves. Pollution, trawling that rips up the seabed, the destruction of mangroves and overfishing have made the catch uncertain. Fishers venture further out to deeper waters. On many days, Joey and his colleagues catch nothing at all.

How about if Joey could have pressed an emergency button to call the coastguard and send them his location? Or what if his wife, Amanda, could have alerted the coastguard that he was missing, and that they could track his movements at sea?

The mFisheries app

A mobile application with just such features exists. Called mFisheries, this app was developed by the Department of Electrical and Computer Engineering at the University of the West Indies with

support from development agencies such as the International Development Research Centre (IDRC) and the Technical Centre for Agricultural and Rural Cooperation (CTA).

To use the app, fishers need a smartphone with global positioning capabilities. While the app will work on any suitable Android phone, it is best to have one that is waterproof and shock-resistant so it can survive the knocks and splashes that are unavoidable on a pitching boat. The mFisheries team recommends phones such as the RugGear RG600 which have large screens, a long battery life and rugged construction.

Fishers can install the app on their mobile phone for free. When the app is running, they can tap the screen to call up various functions.

- The **navigation** feature shows what direction is home, and users can set and retrieve locations of sea features such as reefs. It uses the phone's own global positioning sensors and open-source maps.

- The **weather and tide** information comes from open data sources. The tide data, for example, draw on Global Tide, a service that gives information on the timing and height of tides around the world.

- The **first-aid** component shows pictures of emergencies along with written and audio instructions on what to do. This information comes from the Caribbean Fisheries Training and Development Institute.

- The **podcasts** give audio tips in the vernacular language on topics like fish handling and methods, emergency maintenance, avoiding accidents, and preparation for sea. These tips also came from the fisheries training institute.

- The **camera** component can be used to take photos of pollution and boats that are fishing illegally, and report these to the authorities or store them on the web where the fisher can access them through a personalized portal.

- The **SOS** function sends an email, SMS and an automatic phone call to the coastguard. It also sends an SMS or email to other people that the fisher chooses – such as his family. These messages include the time, date and location of the phone.

- **Alerts** sends custom messages to predefined persons.

- In countries where market price information is published, the **prices** feature displays what prices to expect at various markets. That makes it possible for the fisher to negotiate with the buyer while still at sea.

Many features, including the navigation, work anywhere. Other features work only if there is mobile phone coverage, which can be up to 15 kilometres from land, though many countries have dead spots within this range. If someone sends an SOS alert outside of range, the message will transmit automatically if the boat drifts back into coverage.

Designing the app

The team that initially developed the app covered the various disciplines needed: engaging with stakeholders and partners; designing, developing, testing and deploying mobile and web applications; developing and delivering learner-centric training; and coordinating and executing field work. All team members were also involved in the training and support of mFisheries users. The team consisted of the following:

- A team leader, who steered the project.

- A systems analyst, who analysed the requirements and ensured the app is secure.

- A mobile developer and “ICT evangelist”, who designed and developed the mobile app.

- A web developer, who was responsible for the web-based components.

- A designer, who handled the visual design and engagement with the fishers and other stakeholders.

- An instructional designer, who worked out how to train fishers how to use the app.

- An operations coordinator, who was responsible for logistics and engaging with stakeholders.

- A field liaison officer, who was responsible for field operations and engaging with fishers.

The field liaison specialist was Joey's wife; her father and father-in-law are also both fishers. With her deep roots in the community, she engages naturally with fisherfolk, understands their problems and can work with them to find solutions.

The app was designed after a survey of over 500 fishers in Trinidad and Tobago in 2009. The survey respondents said they wanted a way to find out prices of fish in various wholesale markets in their country. That would give them more power in the market. If they knew the price in the wholesale market in San Fernando, for example, they could bargain with the buyer who met them on the beach. The respondents also said they were very concerned about safety at sea: the risk of piracy, storms, or accidents. The mFisheries prices, SOS and tracking facilities were designed in response to this.

Three fish in one net

The mFisheries app is useful not just for the fishers. It is also a valuable tool for various branches of the government. The most obvious is the coastguard. With few boats and personnel but huge areas of sea to patrol, this is overstretched. The SOS alerts come with accurate GPS coordinates, so it can dispatch a boat to the right place quickly. Fishers can report suspicious vessels that might be smuggling drugs to or from neighbouring countries. The georeferenced photographs help with fisheries protection and pollution surveillance.

The app can be set up to also feed valuable information to the fisheries cooperatives and ministries responsible for fisheries management. With the permission of fishers, these agents can track the location of fishing boats and work out what areas are being over- or under-fished. They can also determine fees to charge for fishing in co-managed areas such as those around fish-aggregating devices. Information on fishing patterns is critical for policymaking and for formulating rules on using common marine resources.

The mFisheries app and its associated web portals solve three problems:

- It reduces the operational inefficiencies and risks faced by fishers.
- It increases the amount of information available to both fishers and fishing-related organizations.
- It creates new ways for fishers and organizations to communicate with each other.

Reconfiguring the app

Different fishers have different needs, and new possibilities are constantly emerging. CTA support enabled the mFisheries team to rebuild the software to make it more flexible:

- It is now easy to update the software and add new functions, such as (potentially) mobile money and early-warning notifications.
- Users can also now personalize their mFisheries screens to feature only the components they want.
- Each country can also now adapt the app to suit its own needs.

This last point requires explanation. Each Caribbean country is responsible for its own territorial waters and the surrounding seas, and each has its own fisheries and search-and-rescue agencies. The mFisheries SOS and tracking features require connections to these agencies and must be integrated into their systems. With CTA support, the mFisheries team rebuilt the software so each country can adapt it to its own needs.

- The boundaries can now be configured to match each country's area of responsibility.
- Connections can be made easily between the mFisheries users and the local authorities through country-specific SOS and tracking.
- The agencies can configure the contact information for local search-and-rescue and other services.
- Local authorities can view and manage incidents at sea through own web portal.
- Neighbouring countries can now cooperate more easily, for example by sharing SOS and tracking data.
- Countries and agencies can set up their own portals to view the information they require. For example, a national fisheries agency can track the locations of fishers (with their permission), or a vendor can get automatic notifications if a boat is approaching a landing site.

The mFisheries app is now freely available for countries in the Caribbean and around the world to use in their own fisheries sectors. Once the country has set up a tracking and SOS alert system, the app is ready for use. Developers can also extend or adapt the software for their own purposes.

The mFisheries screen is customisable



Promotion

The mFisheries team has promoted the app in Trinidad and Tobago mainly through meetings with fishers in each port. These meetings were originally arranged by organizations in the fisheries sector, such as the fishing associations, the public-sector Seafood Industry Development Company, and the Caribbean Fisheries Training and Development Institute. As the team developed relationships in the sector, it began arranging meetings directly with fishers. The team provided interested fishers with phones at a discounted price with the app pre-installed. This was necessary because few of the fishers had their own smartphone or knew how to use one.

Fishers can also download the app from the mFisheries website or from a restricted user group in the Google Play Store, a download centre for Android phones. The user group has to be restricted because it has to be configured for a particular country so that the coastguard, for example, can respond to distress calls made from its territorial waters.

Costs and revenue

The main cost associated with mFisheries has been for the salaries of the team who developed the app. Other costs have included the field survey, engagement with fishers

and other stakeholders as well as promotion. Travel within the Caribbean is relatively expensive, so this has limited the team's ability to promote the app outside Trinidad and Tobago.

The costs of developing the app have been borne by project funding: IDRC supported the development of the initial app, while CTA paid for the rebuild to make it scalable. The University of the West Indies provided infrastructure and facilities, while partners such as the coastguard assisted in many ways, including local transport. British Gas provided smartphones. Other assistance was forthcoming from Digicel, a local telecommunications operator, which provided zero-rated data service in the early stages of the project and subsequently offered a discounted rate for fishers. This cut the amount the fishers had to pay for running their phones.

The app is currently free for fishers to use (though they must cover their data charges). Would it be possible to cover some of the development costs by charging them a fee? In theory, yes: people are used to paying to use a mobile phone. We might expect them to pay a fee of US\$2.00 to get services that can help them increase their income (such as market prices), make their lives easier (navigation) and keep them safer (SOS, weather and tides).

Fees are unlikely to cover the costs of maintaining and upgrading the system, at least until a sufficient number of paying subscribers have been signed up. One possibility is to start by charging a small fee, subsidized by the government, and to reduce this subsidy gradually over a period of, say, three years. The level of subsidy (and thus the price for the user) might depend on the users' agreeing to share data with the authorities.

Navigation hazards

For fishers to start using the app, they have to navigate across several "reefs". They first have to hear that the mFisheries app exists, and find out how to get it. They must have (or acquire) a suitable smartphone, download and install the app and learn how to use it.

One tricky shoal is getting fishers to agree for the location of their phones to be tracked, and for this information to be transmitted to

Joey and his father-in-law hauling an outboard motor



the coastguard. The coastguard needs this information so it can dispatch a vessel or aircraft to rescue a fisher in distress. If a boat goes missing without sending out an SOS call, the coastguard can check where it was at particular times and can work out where it is likely to have drifted. But some fishers do not wish the government to track them too closely. That is especially true if they are engaged in illegal activities.

A proportion of potential clients runs aground on each reef. Experience shows that it is difficult to navigate all of them successfully.

The mFisheries team has undergone several changes in crew. Two members left the team to take up graduate study; another two got better-paying jobs elsewhere. It was difficult for the project to recover after losing more than half its crew.

Moving to a supporting role

Despite these problems, mFisheries now consists of a scalable, reconfigurable web platform and mobile application suite with useful (even life-saving) features, available at no charge. The University of the West Indies lacks the skills and resources to promote the app widely in the fishing community. So it is now up to fishers' organizations and other agencies working with fishing communities to do so. The mFisheries team can play a supporting role by engaging with such organizations and with fishers themselves about their needs and proposed solutions, making changes and extensions to the app, providing group-based training, and sharing its experiences in designing, building and deploying the app.

Business model

mFisheries is a multifunctional app that provides navigation assistance, price information, practical tips and an SOS emergency service ① to small-scale coastal fishers ②. It also provides boat-tracking information to the coastguard and fisheries managers. The University of the West Indies recruits users via fishers' networks and through government contacts ③. Users download the app; the university has provided subsidised smartphones to some ④. The university developed and upgraded the app, which uses open-source code ⑤; the main resources have been staff skills and time ⑥. The most important service providers are the coastguard, fisheries management organizations, and the fishers' associations ⑦. The users do not pay for the service, though it would be possible to introduce a small charge. Income has come instead from development grants, project funding, and subsidies from the mobile phone company and the university itself ⑧. Most of the costs go on staff, facilities and logistics, though much of the true cost has been covered by the project partners ⑨.

⑦ Business services and partners	⑤ Key activities	① Product or service	③ Customer relationships	② Clients
Fishers Coastguard Fisheries Division Ministries Academic community Developers	Revising software for architecture and scalability Marketing Hackathons, open-source code	Mobile application (for small-scale fishers): GPS, compass, tide, weather, first aid, camera, SOS Tracking (for coastguard) Fishing activities by location (Fisheries management) Data for livelihood support (Ministry of Social Development, academics, development organizations)	Regional and national fisheries organizations and networks Personal contacts Fishers Fisheries officers Government Students	Small-scale fishers Coastguard Fisheries management Ministry of Social Development Academics
	⑥ Key resources		④ Channels	
	Human resources Physical infrastructure Financial Information, data		Face-to-face, web download, Google Play, voice support Reports, meetings	
⑨ Costs		⑧ Income		
Human resources Infrastructure, facilities – covered by host institution Logistics – covered by partners Time – covered by partners		Development grants, project funding Subsidies from phone company		

An app for fishers

The next steps are to:

- Reduce the barriers preventing fishers from adopting the app, for example by offering services such as weather forecasts without requiring the users to register and agree to divulge their location.
- Have fishers themselves promote the app to their peers.
- Collaborate with similar initiatives around the world to form a network of developers of information and communication tools for small-scale fishers. A first meeting was held in November 2016 in South Africa.

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mFisheries staff working with fishers on shore



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