### World Bank app makes it easy to conduct complex surveys anywhere in the world

**Highlights**

- The relatively small development team jumped straight into development with the familiarity of Visual Studio and C#.

- The app supports complex questionnaire structures with branching logic, dynamically created question lists, pop-ups, and radio buttons.

- If the World Bank decides to expand to additional platforms in the future, the code sharing capabilities will provide a cost effective option.

---

**SECTION 7: HOUSEHOLD ASSETS**

Q1. Does this household own any of the following General Items? (Read out items and tick all that apply)

- Bed
- Mattress
- Mosquito net
- Table (dining)
- Lounge suit / sofa
- Radio / stereo
- Television
- Satellite dish / decoder (free to air)
- Satellite dish / decoder (DSTV)
- Other pay TV
- DVD / VCR
- Home theater
- Land telephone
- Cellular phone
- Computer
About the World Bank

Since 1946, the World Bank has provided loans to countries in development and transition, providing more than $40 billion in loans in 2014 alone. Supported by the 188 states of the United Nations, the World Bank’s mission is to end extreme poverty and to push for greater equity. With more than 12,000 staff in Washington D.C. and 130-plus countries, the World Bank has a major impact on the lives of billions of people, especially those in the poorest countries.

“This is not a typical mobile application. It has a range of controls that are more like a desktop application, and Xamarin helps us make sure we are getting the best performance.”

Zurab Sajaia, Senior Economist, World Bank Group
The need for surveys

Information is critical to their activities and those of their partners, typically government agencies and non-governmental organizations (NGOs). They all use in-depth, one-on-one interviews to collect data on complex factors such as economic development and social change. These surveys can be both vast, including tens of thousands of individuals, and long in duration, lasting years or decades.

Imperfect solutions

Until recently, the only viable collection option in many regions was pen-and-paper, with a high potential for error and inefficiency. The World Bank partnered with the University of Maryland to evaluate existing survey software solutions. “Unfortunately, none of the existing solutions met all the criteria we had identified,” says Zurab Sajaia, Senior Economist, World Bank Group.

Developing for good

“We decided to build our own tool as a free public good,” says Sajaia. Known as Survey Solutions, it combines a mobile app, a survey design tool, and server software that manages surveys and aggregates data. The system development is financed by the World Bank, the Bill and Melinda Gates Foundation, and the Food and Agriculture Organization of the United Nations and is provided free of charge to anybody who wishes to use it.
Building mobile apps with desktop development expertise

The mobile component of the solution was created using Xamarin, chosen by the team because it let them use their existing C# skills to create a highly complex, yet robust, mobile app, and allowed them to jump right into mobile development.

“It just made sense to use Xamarin, because we wouldn’t have to switch or go look for new developers,” says Sajaia. We started building a prototype with it in 2012 and have never looked back.” The application created by the small team of eight has been a great success, with documented use in more than 30 countries and 50 survey projects, several of which are major, ongoing population surveys.

Efficient development environment

The app was first released in September of 2013 and has evolved significantly since then. “We’ve added features and improved the program on a continuous basis, and we’re now building a new version using the knowledge we’ve gained,” says Sajaia.

With Xamarin, the team is able to use the Microsoft Visual Studio development environment they already knew to create and update the C# code for CAPI. Xamarin is constantly updated with the latest mobile platform capabilities, giving the World Bank the widest range of options for new and innovative features.

High-performance, data-rich mobile applications

Because of intermittent or slow internet connections, survey administrators need to be able to store data on devices for uploading later. Xamarin enabled the developers to create on-device data storage that could hold the results of surveys that sometimes contain thousands of questions.

“This is not a typical mobile application,” says Sajaia. “It has a range of controls that are more like a desktop application, so we need to make sure we are getting the best performance.” Using Xamarin, the team was able to create a system that supports complex questionnaire structures with branching logic, dynamically created question lists, pop-ups, radio buttons, and more, all on devices with a wide range of processing capabilities.
Most of the people using the app are local workers hired by the state agency or NGO, and they have a wide range of technology skill levels. The team needed to make an app that is approachable for almost anyone, with the power to create and administer very complex surveys when needed.

"Users seem to find it quite intuitive and pick it up quickly," says Sajaia. "In some cases, I've seen organizations set aside two weeks for training and within one day the users would be comfortable with the tool." The team was had access to the full range of Android user experience capabilities because of Xamarin's native access to platform features.

Early on, the team decided to focus on one operating system rather than supporting multiple versions. "When the team started development in 2012, our only viable operating system choice was between iOS and Android," says Sajaia. They chose to focus their limited resources on Android, in part because Android devices could be purchased at a low enough cost to make the software attainable for organizations with smaller budgets.

The cross-platform development capabilities of Xamarin figured into the team’s choice from the beginning. Although they have not yet created iOS or Windows versions of the apps, they are likely to at some point. "If we decide to create a version for another mobile operating system, we can do so very inexpensively," says Sajaia. "Xamarin will let us reuse the code from one platform to another."

"If we decide to create a version for another mobile operating system, we can do so very inexpensively because Xamarin will let us reuse the code from one platform to another."

Zurab Sajaia, Senior Economist, World Bank Group