

People in Need Provides Lifesaving Early-Storm-Warning System Using AWS

People in Need is using AWS to scale an early warning system in Cambodia that alerts about 400,000 subscribers when floods threaten. Based in the Czech Republic, People in Need is a nongovernmental, nonprofit organization engaged in humanitarian and development work in more than 20 countries. The People in Need early warning system runs both sensor technology and an open-source IVR solution using Amazon EC2, AWS Elastic Beanstalk, Auto Scaling, and Elastic Load Balancing.

Deadly Rains

August is always wet in Cambodia—the month comes in the middle of the country's early rainy season—but in August 2011 the monsoon rains turned heavier and more relentless than usual. Eventually, floodwaters inundated 18 of the country's 25 provinces.

By the time the floods receded that December, about 1.2 million people had been affected, including more than 45,000 families who had to flee their homes. Dozens of miles of rural roads had been swept away, cutting off remote communities, and there was widespread damage to buildings and infrastructure. Worst of all: About 250 people had drowned.

A Long History of Floods

Those 250 deaths are a grim reckoning by any measure, but even grimmer is the fact that the 2011 floods are not the worst Cambodia has experienced. They aren't even the worst in recent memory: flooding in 2000 affected close to 3 million people and left 374 dead.

Fully 75 percent of Cambodia lies inside the floodplains of the Tonle Sap—the largest lake in Southeast Asia—the Mekong River, and the Tonle Sap River, which routinely

breach their banks during each rainy season. The result: significant flooding afflicts Cambodia almost every year.

This circumstance has bedeviled this area for as long as people have lived there. In the 1300s, a massive flood may even have contributed to the collapse of the ancient Khmer city state of Angkor, despite the fact that its intricately designed water-management infrastructure was then the most advanced in the world.

Clearly, flooding will always be a fact of life in Cambodia. But that doesn't mean steps can't be taken to reduce the dangers it poses. The visionary architects of Angkor attempted to do so with the fourteenth century's best available technology and expertise. What might twenty-first-century technology and expertise be able to add to the story?

Fifteen Minutes to Live

People in Need (PIN) wanted to find out. A Czech Republic-based nongovernmental, nonprofit organization that operates humanitarian projects in about 20 countries, People in Need had been looking for ways to help Cambodia reduce the harm of frequent flooding ever since it arrived in the country in 2008. In 2013, in partnership with the European Commission



Company	People in Need
Industry	Nonprofit Organization
Country	Czech Republic
Employees	1,000
Website	www.clovekvtisni.cz/en

About People in Need

People in Need (PIN) is a nongovernmental, nonprofit organization that operates humanitarian projects in about 20 countries. The Czech Republic-based organization works to break cycles of poverty and disaster, especially by deploying IT solutions.

Benefits

- Achieved scalability to protect 400,000 potential flood victims
- Avoided the capital cost of provisioning traditional data center resources
- Protected solution from local disasters

AWS Services Used

- [Amazon EC2](#)
- [Amazon RDS for PostgreSQL](#)
- [Elastic Load Balancing](#)
- [Auto Scaling](#)
- [AWS Elastic Beanstalk](#)

The People in Need early warning system will scale with AWS Elastic Beanstalk to protect about **400,000** people.

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James Happell
Innovations Manager, People in Need

for Humanitarian Aid and Open Institute, PIN began work on Building Disaster Resilient Communities, a project to help Cambodian communities move from a reactive to a proactive stance toward flooding and other disasters.

“With the effects of climate change already being felt in the country, resilience in the face of extreme weather events is only going to become more vital,” says James Happell, an innovations manager for PIN, who explains that project goals included risk-reduction training and planning, strengthening infrastructure, and introducing more sustainable agricultural techniques.

Worthy goals all, but necessarily long-term. As PIN considered how the goal of disaster resilience could be advanced in the short term through technology solutions, it identified some low-hanging fruit: according to a study performed after a 2011 floods, 36 percent of Cambodians had received no government warnings or other emergency information; of those who did receive warnings, 72 percent received them too late to take action. “The sad thing is that so many flood-related deaths are avoidable,” Happell says. “Just 15 minutes’ warning can be enough to allow people to seek higher ground, and oftentimes it’s possible to predict these events hours or even days in advance.”

Even before the community-level transformations envisioned by the project could come to pass, PIN realized many lives might be saved each rainy season by providing timely warnings. The only problem to solve was how to get the warnings to the people who need them.

An Early Warning System on AWS

As PIN considered possible solutions to this problem, the organization recognized that the country’s expanding mobile-phone networks could be used to deliver messages as part of a Cambodian early warning system. “Many Cambodians live a relatively low-tech lifestyle, with a lot of rural communities lacking even landline phone connections,” says Happell. “Mobile phones are the exception: almost everyone has one.”

But what would be the best way to deliver the emergency warnings to Cambodians’ mobile phones? A combination of low literacy levels and the difficulties of rendering Khmer script on phone screens made SMS messaging a poor option. Prerecorded voice messages offered a solution, but that presented an obstacle as well: the cost of commercially available interactive voice response (IVR) solutions.

With the assistance of Open Institute, PIN worked to develop an emergency warning delivery platform. PIN has added to this platform over time, most recently by working with a local developer on a custom-built, hosted, open-source IVR platform called Somleng, which—when used with RapidPro, an open source call-flow manager—can be used to transmit recorded voice messages to preselected groups of mobile phones, such as all of those in an area threatened by a weather-related emergency.

The big remaining question was where to host the solution, which PIN named EWS 1294. “For past projects, we’ve hosted our solutions in collocated data centers, but we weren’t thrilled at that prospect for this project,” says Happell, going on to explain that EWS solutions require the ability to scale up and down dramatically during emergencies. “With an EWS system, you might need almost no resources almost all year long, then suddenly you’ll need to be able to send out tens of thousands of messages as quickly as possible. Achieving those capabilities in a traditional data center is an expensive proposition, and a local data center could be affected by the same emergencies we’d be trying to warn people about.”

In June 2016, People in Need turned to the Amazon Web Services (AWS) Cloud for the scalable, reliable, and cost-efficient hosting it needed for its EWS 1294 solution. During emergencies, the solution uses [AWS Elastic Beanstalk](#), [Auto Scaling](#), and [Elastic Load Balancing](#) to automatically scale up [Amazon Elastic Compute Cloud](#) (Amazon EC2) On-Demand instances. In addition to [Amazon RDS for PostgreSQL](#) for deploying and managing PostgreSQL instances, the solution includes third-party, open-source software such as

FreeSWITCH telephony software and the Adhearsion telephony application framework. With the redundant AWS global architecture, the solution is highly available and protected from local disasters.

“AWS services are really vital to the solution,” says Happell. “We’ve already had to send out about 30,000 messages in response to one storm, and it would have taken much longer without the capabilities of Elastic Beanstalk.”

Scaling with the AWS Cloud

The flexible, on-demand, scalability available on AWS will be even more crucial as the service grows. “We have about 50,000 subscribers in six Cambodian provinces now, but we are projecting about 80,000 by the end of 2017 and are planning to be active in all the flood-prone reaches around the Mekong and Tonle Sap by the end of 2018,” says Happell. He explains that the solution could effectively cover an additional 320,000 people who live in subscribers’ households. “The powerful scalability available on AWS could help us protect as many as 400,000 people from dangerous floods.”

Given that projected growth, the AWS pay-as-you-go model is also crucial. “Securing the resources for all of this in a traditional data center would cost us thousands of dollars up front and hundreds of dollars a month for the life of the solution,” says Happell. “Without AWS, we simply couldn’t afford to provide this lifesaving service for the people of Cambodia.”

People in Need has also developed a flood detection unit to detect dangerous water levels at the source. Designed by Robert Ryan-Silva from DAI in the United States and with funding from the USAID Development Innovations project, Tepmachcha is a solar-powered, GSM-enabled, sonar-based stream gauge, built on open-source technology. At predetermined intervals, the device uses sonar detection to measure the height of the water at its location and sends this data over the cellular phone network back to a centralized web dashboard. If dangerous water levels are detected, the system automatically sends out a mobile alert message to people in the affected areas. Happell says that, in a future phase of the project, he will evaluate using services such as [AWS Greengrass](#) and [AWS IoT](#), which will relieve IoT developers of the need to manually map sensor IP addresses to virtual machines or the backend of applications—and not only for EWS 1294.

“With AWS, the sky is really the limit for technology solutions to age-old problems,” says Happell. “AWS allows us to think big and get creative about solving issues we couldn’t have tackled even five years ago. The list of AWS features is amazing, and with new functionalities coming online all the time, we know AWS will be able to help us implement just about anything we can dream up to help the people of Cambodia.”