



1 World Connected
Data-driven Research to Bring Billions Online

ELECTRONIC HEALTH RECORD SYSTEM

AN E-GOVERNMENT SERVICE IN COSTA RICA



The EDUS logo. Photo credit: EDUS

EXECUTIVE SUMMARY

EDUS works with the Costa Rica Social Security Fund to implement and manage a national online health information system serving the 5 million inhabitants of the country across 29 hospitals and 1,041 sole practitioner clinics. The health information system is a centralized repository of comprehensive patient health records used by doctors and nurses, and an interface for patients to schedule appointments, access health records, and manage their healthcare.

Keywords: e-health, e-government, Costa Rica

CONTEXT

Between 2010 and 2015, Costa Rica had the highest jump in information and communications technology (ICT) use worldwide, according to the International Telecommunication Union (ITU). In its National Development Plan 2015-2018, the government set a goal of 1,000,000 subscribers to the Internet by 2018, which would make the percentage of Internet users 60 percent of the total population in comparison to 46.7 percent in 2013. Yet, Costa Rica still ranks among the worst countries in terms of Internet speed, according to a February 2017 OpenSignal Report. The government is aware of the problem, and is working to improve the situation.

Digital technologies are one of the seven focus areas in the National Plan of Science and Technology. To achieve the goals, the government has partnered with the private sector to embark on the digital transformation for the country. In 2016, the Ministry of Science, Technology, and Telecommunications signed a memorandum of understanding with Cisco to make a joint effort to digitize the government, education system, healthcare, cybersecurity, and other fields. Unfortunately, though, little is known about the level of digital literacy among Costa Ricans.

Costa Rica			
Population (UN, 2015)	5,001,657	Fixed broadband subscriptions (%) (ITU, 2016)	11.59
Population density (people per sq.km) (UN, 2015)	97.88	Mobile cellular subscriptions (%) (ITU, 2016)	159.23
Median household income (Gallup, 2006-2012)	US\$ 8923	Individuals using the Internet (%) (ITU, 2016)	66
Education (Mean years of schooling) (UNDP, 2013)	Male: 8.3 Female: 8.4	Individuals using the Internet by Gender (%) (ITU, 2016)	Male: 66.3 Female: 58.2

PROJECT DESCRIPTION

EDUS launched in 2012 with the aim to enact a government law mandating accessible healthcare to all citizens, and implement a comprehensive patient health record database for primary (clinical) and secondary (hospital) care.

The project has been underway for five years, and 90 percent of the system's implementation has been completed. Implementation involves preparing the hospital or sole practitioner clinic for Internet connectivity, setting up the necessary computers and information technology, entering patients into the database, and training health care providers and technicians to use the system.

There are three aspects to the transition for health care personnel: change management, training on computer basics, and training on the database and affiliated apps. Training is a three-day process in a classroom with an additional three days of on-site technical support.

The database covers 29 hospitals and 1,041 sole practitioner clinics. These clinics typically serve 2,500 to 4,000 patients, and have five employees, all of whom are trained in the use of the system. Internet speeds are typically 6-10 megabits per second (Mbps)

Project specifics			
Technology	Database, website interface and application	Training	Training in classrooms (3 days) and then on-site training in real time (3-4 days).
Year of connectivity	2012	Cost to users	Free
Geography	Mixed	Total cost of program	Fixed: US\$ 232 million Operational: US\$ 250 internet cost per month per clinic, US\$ 450 internet cost per month
User profile	Doctors, nurses, technicians, and patients	Associated organizations	Instituto Costarricense de Electricidad (Internet and MiFi provider)

PROGRESS AND RESULTS

As of December 2016, primary care implementation is complete, and all 5 million national citizens are in the records. Furthermore, hospital care implementation is 61 percent completed. By 31 December 2017, the goal is 63 percent implementation in hospitals. By 31 December 2018, the goal is 99.9 percent implementation in hospitals, and 61 percent overall implementation.

Centralization allows the government to detect redundancies and abuses of the system – for example, patients who try to acquire drugs at multiple places or who see multiple doctors about the same concern. Patients are assigned to a specific doctor based on location, and patients can only see their own doctor unless it is an emergency.

Each doctor is assigned to 2,500-4,000 patients. This maintains the proper distribution of patients and doctors so the system can work smoothly. Moreover, anyone can pull up a patient file anywhere.

CHALLENGES

Resistance by healthcare providers – Training for nurses on how to use computers and the online system was crucial. Nurses were accustomed to taking notes on paper, so the new system altered their work flow substantially.

Lack of Internet infrastructure – Before the system could be implemented, they first had to provide Internet to all the hospitals that did not have service. Only 33 percent were initially connected, so they provided for the rest using fiber-optic connections. They worked with the Instituto Costarricense de Electricidad, an Internet service provider (ISP), and the government to connect the hospitals and clinics. The problem was not just the lack of existing connections, however, but also the terrain of Costa Rica (mountainous and coastal), so it took one-and-a-half years to connect all hospitals. A total of 99 percent of the regions served had no local area network, so they had to install one. A special contract with the Instituto Costarricense de Electricidad through the government reduced the cost.

Lack of electricity infrastructure – In many cases there was either limited electrical infrastructure, or the clinical building was so old that it needed to be retrofitted. A total of 5 percent to 30 percent needed updating in this regard. For the few clinics lacking electricity, they used MiFi, which is an Internet chip that can be used with 3G and 4G services to make a “mobile-fi” Internet connection.

EDUS’ SUGGESTIONS FOR FUTURE PROJECTS

Planning for change management is useful – EDUS’ experience suggests it is important to not start any project without some change management system in place, which addresses personnel expectations as well as skills training for the new programs and applications. Peer-to-peer skill learning was shown to be most effective, which may mean training doctors and nurses separately and empowering them to teach one another within their groups. The system changes every year, with new personnel and new programs, and they require continuous training. Change management can be implemented in each hospital and community – not just via top-down implementation from the project headquarters, but it may likely benefit from being an ongoing and dynamic process.

Considering local sensitivities is necessary – Local visits and meetings with patients, healthcare providers, community organizations, and union groups were key to garnering local support and compliance with the system. It is important to have local concerns in mind with each clinic/hospital based off on-the-ground interaction with the affected personnel and communities. Implementing a new system can incidentally alter the culture of a community. An automated system removes opportunities for socializing, and can generate resistance because of the changes in social organization it entails.