
Digital IDs are an effective tool
against poverty.

A global solution is making them available to millions.

PART ONE:

Our global identity problem

If a person cannot prove who they are, can they take advantage of all of the opportunities society has to offer?

For the 850 million people around the world who lack any acceptable form of legal identity, the answer is no. Proof of identity enables people to fully participate in the economy. It eases access to employment and education as well as services such as banking, government programs, and health care.

People living in low- and middle-income countries are more likely to go without ID. More than half of those without proof of identity are children whose births were not registered. One in two women in low-income countries do not have ID. And even among those whose identity can be verified, many lack documentation that is suited to the digital age.

This means many of the resources that could help them improve their quality of life are out of reach.

Fortunately, a formidable solution has emerged: an open-source, customizable digital ID system called Modular Open Source Identity Platform (MOSIP) that is available to all countries for free.

Hear from Ramesh Narayanan, Chief Technology Officer, MOSIP

0:00 0:33

Ramesh Narayanan: *There is an identity crisis in the world, but that'll get solved. But beyond the identity crisis, it's about how people can be part of the digital economy that is getting built and how they can actually leverage that. Our journey, our hope is to make it easy for people to be part of the digital economy. There are talks of digital divide. We don't want the divide to exist. Our tools will help bridge that divide and make it a seamless experience for any and every person in the world.*

A small but mighty team in India developed this technology for creating national digital ID systems, with funding from our foundation. Since 2018, 11 countries, nine of them in Africa and two in Asia, have signed memoranda of understanding with MOSIP to pilot the system. More than 90 million people have been registered for MOSIP-based IDs in the Philippines, Ethiopia, and Morocco as part of national deployments. MOSIP is a powerful example of how low- and middle-income countries can harness open-source technology to improve lives and accelerate development.

Digital ID is a critical piece of digital public infrastructure

Digital ID systems are one of the three pillars of what's known as *digital public infrastructure* (DPI); the others are digital payment systems and data exchange systems. By connecting people and making it easier to move money and share information, DPI is in many ways the modern-day equivalent of the roads and bridges that helped reshape economies in the 19th century. Researchers say that DPI can help low- and middle-income countries leapfrog traditional stages of development, lift millions out of poverty, and spur economic growth.

Explainer: What is digital public infrastructure?

Digital public infrastructure (DPI) is a powerful tool for reducing poverty. Our expert explains what it is and how it's transforming economies worldwide.

Read more

A digital ID system is critical because people need a verified identity in order to tap into DPI's other benefits, from digital bank accounts and instant payments to mobile phone accounts and personal data management.

The original inspiration for MOSIP was India's national digital ID system, Aadhaar, which launched in 2009. This ambitious effort would eventually enroll over 99% of all Indian adults.

S Rajagopalan, a professor at the International Institute of Information Technology Bangalore (IIIT-Bangalore), was sure that Aadhaar would be transformational. In the early 1990s, he had worked on technology for people living in poverty in rural areas of India. He saw that access to services was a recurring problem because the villagers didn't have IDs. They needed an intermediary to vouch for them when they went to a hospital, for example, or when they wanted to access subsidized rations like wheat, pulses, or sugar. This issue especially affected women living in poverty.

"Accessing what is rightfully due to people became a problem because ***they were not able***

to prove whom they are.”

S Rajagopalan
Co-founder
MOSIP

Share

True to Rajagopalan’s prediction, Aadhaar transformed life for people across India. Access to an inclusive digital ID system meant that people no longer had to rely on intermediaries. The system also made life easier in other important ways. Within a decade, bank account ownership in India more than doubled, to 78% in 2021, and brought millions of Indians, especially women, into the formal economy. This achievement would otherwise have taken 45 years. The system has broadened the reach of social safety net programs, reduced waste, and made the government more responsive during times of crisis.

Rajagopalan and a team of programmers at IIIT-Bangalore wanted the benefits of a system like Aadhaar to reach a global audience. So they set out to build MOSIP—a flexible, inclusive, and trusted digital ID system that any country could customize to meet its specific needs.

PART TWO:

An open-source solution

MOSIP offers a digital ID solution that any country can adapt and use

The success of Aadhaar in India triggered a surge of interest in digital ID technologies around the world. By 2018, more than 60 countries were trying to develop such a system, including every country in sub-Saharan Africa.

But countries could not simply copy and use Aadhaar—or other national digital ID systems like those in Estonia and Singapore—because those systems were owned by the governments that developed them. They instead turned to commercial vendors, making costly investments that yielded frustrating results because the systems suffered from "vendor lock-in." Commercial vendor software was proprietary, which meant governments could not customize it without tying themselves—financially and functionally—to a given vendor. Countries ran the risk of having to start from scratch when their needs evolved beyond a vendor's capabilities—such as when they needed to reach specific populations or connect to a different government system to disburse welfare payments.

When MOSIP launched in 2018, it offered governments an alternative. MOSIP is a digital public good, which means that everything about the technology is open. All of the code and documentation is publicly available. Anyone is free to use the software and build on top of it. The use of open standards means that other systems can easily plug into MOSIP.

Hear from Resham Chugani, Product Manager, MOSIP

0:00 0:48

Resham Chugani: *Now once you have the ID, how is it actually important? Why is it important? Because once I have the ID, I can avail services. Now in a country, let's say for example, you go to any African country or you go to Philippines or you go to Morocco. Today, if you want to deliver services, it's easier to identify an individual uniquely with his or her identity, authenticate them since we are capturing their biometrics. So you're sure that this person is who he claims to be, and then you provide the service. And in this case, you're also avoiding double-dipping. So you don't render the same service twice to the same person because you're validating against the biometrics of the ID system that the ID system holds and you're actually delivering services to individuals.*

MOSIP alone does not do it all – for the system to be fully functional, governments also need biometric device vendors, deduplication software providers, card or credential printing machines, and system integrators, all of which require additional investment. If a digital ID system is a car, MOSIP is the engine, and these ancillary items are the wheels, seats, steering, and lights.

So the MOSIP team made it easier for governments to build the car. MOSIP developed a thriving ecosystem of more than 80 commercial vendors to provide those ancillary services so that adopting governments had choices. More competition helps keep prices low, so MOSIP provides free training to commercial partners, local and international alike, and created a marketplace where partners could showcase products and services to governments. MOSIP also oversees an independent

certification process for commercial partners, ensuring small and large players could compete.

By 2021, six countries had adopted the MOSIP system, three times more than the team had expected. Success stories flooded into MOSIP's offices at IIIT-Bangalore. In one African country, 550,000 students started receiving government benefits after the MOSIP team wrote a tool that imported their existing biometric data from the education department into the ID system. In one Asian nation, the government issued bank account numbers when people registered for the country's ID system, resulting in 8 million bank account applications.

PART THREE:

Inclusion for adaptation

MOSIP's keys to success: security and inclusion

Success was not inevitable. MOSIP's biggest challenge was meeting demand. Morocco signed up before the MOSIP programmers had written a single line of code, and others eagerly lined up. Many nations wanted to expedite their adoption after the COVID-19 pandemic exposed huge systemic vulnerabilities, including governments' inability to identify who needed help and how to quickly send them aid.

Then there was the anxiety the team felt, on a deeper existential level, about what it would mean for the future of digital ID systems if MOSIP failed. They worried that it would stymie future development. "It was a situation that gave us a lot of pause," said Arun Gurumurthy, MOSIP's head of strategy and resourcing.

There was good reason for their nerves. No one had ever attempted to build a system like MOSIP, which sought to register the entire population of a country regardless of its size, geography, or cultural characteristics. The system had to be flexible enough

to accommodate a country as small as 5 million people and as large as 100 million or more people. It had to be able to enroll a population spread across 7,500 islands, as in the Philippines, or across mountains and deserts, as in Morocco. With every country adoption, the team encountered new challenges. And it had to be secure, as it managed peoples' sensitive data.

Hear from Meghna Das, Head - Content Strategy, MOSIP

0:00 0:32

Meghna Das: *We are trying to address one of the many problems that the developing world faces today. And we would like to do that with as much thought, as much vision, as much integrity as possible. And I think we are doing that to the best of the ability of our experts, our advisors around the world, our partners in academia, in industry, in governance. So I'd like to come off as a company, a project that wants to make a meaningful difference and is trying to do that in as meaningful way as possible, powered by as much expertise as possible.*

But the MOSIP team had one big advantage: Because they were based at a university, their decisions weren't driven by business objectives. This allowed them to make inclusivity, safety, and user feedback high priorities. They engaged in research collaborations with global institutes like the Alan Turing Institute and Carnegie Mellon University, with the aim of co-creating state-of-the-art technologies incorporating security and privacy as key design principles. They built an international advisory group of experts in identity that brought a global perspective to how the technology is designed, developed and disseminated.

Together, they anticipated challenges, sought feedback from the field, and modified the software in response.

The Philippines was MOSIP's first large-scale deployment. The country had spotty internet connectivity in remote places, so MOSIP worked with vendors to engineer special field kits that let enrollment officers travel door-to-door to collect people's information and then upload the data into the system in batches later, when they had connectivity. MOSIP also made the ID credential a digitally signed QR code so it could be verified offline—a feature that is now standard in the system.

In Africa, where almost two-thirds of people still use feature phones, the MOSIP engineers had to figure out how to enable authentication despite the limited functionality of the devices. They also sped up pilot testing, which initially took so long that governments would sometimes change before they finished. The team retooled the model to shrink the pilot period from 18 months to three months. To make the pilot implementation more affordable for countries, MOSIP supplied biometric devices and other elements of the pilot so countries only had to spend a few thousand dollars. Within four months of a successful trial in Togo, four other countries signed up to run pilots.

*“We are **experts in the ID system**, but we never think we know everything.”*

Nagarajan Santhanam
Chief Dissemination Officer
MOSIP

Share

To maximize inclusivity, the team gave people several options for sharing their biometric data, including scans of their fingerprints, iris, or face. This was helpful in places like Ethiopia, where few people had ever had their fingerprints scanned. One day, an elderly man at a registration center talked excitedly about how his new ID would enable him to access services without having to give a cut to a middleman. But as he placed his fingers on the scanner, his hands shook so much that the machine was unable to get a clear scan. The man worried that he would not be able to get his ID. The dozens of other people in line—mothers holding children, other elderly people—looked on, wondering if they, too, would encounter the same problem.

The operators switched to an iris scanner, which worked. “The gentleman was very happy,” said Krishnan Rajagopalan, MOSIP’s head of country implementation, who was visiting the registration site that day.

PART FOUR:

Reaching the rest of the world

The next step for MOSIP

MOSIP illustrates how technology that can be harnessed for good on a massive scale. The MOSIP team hopes that the system will register 1 billion people over the next decade, while they work on ways to integrate it with other systems to make life easier for people.

Every year on February 14, which the team has dubbed "MOSIP Open Source Day," they celebrate their latest accomplishments and, above all, the millions more people who are benefiting from the system.

The team feels "a sense of satisfaction on the one hand, but it also shows us that we have billions more to cover out there," says Ramesh Narayanan, MOSIP's chief technology officer. "And that drives us."

Hear from Ramesh Narayanan, Chief Technology Officer, MOSIP

0:00 0:41

Ramesh Narayanan: *We know that, every moment, that we are making some change to some life somewhere. And we are hoping that this is all positive impact that we are creating everywhere. When we see that we have millions of people who have been issued IDs based on the MOSIP platform, it actually gives us a sense of satisfaction on one hand, but it also shows us that we have billions more to cover out there, and that drives us. And we also look at ID not just as something that people have as a piece of paper, or a QR code, or a card or something like that; it is about what ID enables for people. What can it bring them?*

Author

Kanwaljit Singh, Ph.D.

Senior Program Officer, Bill & Melinda Gates Foundation

Dr. Kanwaljit Singh leads the foundation's work on digital identity, cybersecurity, and emerging technologies.

More in:

Financial Services for the Poor

Policy & Finance

Published:

Aug 16, 2023

More on digital public infrastructure

Explainer: What is digital public infrastructure?

By Thao Hong
Program Officer, Bill & Melinda Gates Foundation

A story of digital banking in India—and a young woman's promising career path

Harnessing digital technology for public good: An Indian CTO's story

Climate and Development Finance: A transition framework for all

By Melinda French Gates
Co-chair, Board Member, Bill & Melinda Gates Foundation

Development finance reform needs to address the greatest challenges of our era

By Gargee Ghosh
President, Global Policy & Advocacy, Bill & Melinda Gates Foundation

---

Sign up for *The Optimist* newsletter

Subscribe to The Optimist to get weekly updates on the latest in global health, gender equality, education, and more.

Email address

Subscribe

By submitting your email to subscribe, you agree to the Bill & Melinda Gates Foundation's Privacy & Cookies Notice

We are a nonprofit fighting poverty, disease, and inequity around the world.