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SCIENCE & INNOVATION

Today's technology could be the solution to the vision care gap

PHOTOGRAPH BY STEPHANIE SINCLAIR

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Through the use of modern tools and manufacturing solutions, this organization is leading the charge to making the world see better.

WITH MORE THAN a billion people in the world needing glasses, but having no way to get them, an organization called OneSight—the leading global nonprofit bringing vision care to the world—has dedicated itself to the challenge of solving that need. Closing the vision care gap remains a massive endeavor, but new technologies will help overcome the challenge. It's important work, because better vision means a higher standard of life.

OneSight has assembled an impressive team in the United States and around the globe to meet the challenge head on. Originally from South Africa, Dr. Ian Lane, OneSight's senior director of global programming, works on innovative solutions as one of the organization's thought leaders. He agrees that solving the vision care problem is massive. "But at the same time," he says, "it *is* possible. The question we're working on right now is—How long and what sort of resources will it take?"

OneSight is focused on approaching the problem by being able to deliver vision care anytime and anywhere. And in order to be able to do that, the technology that is used has to be very robust, very light, and very mobile. It has to be accurate and reliable, and it's got to be able to connect to the internet.

The organization has been working with technology partners to enable mobile eye care units to literally carry a satellite connection in a suitcase. All of the software developed and identified has been specifically designed to use minimal bandwidth to provide maximum consistency and speed and effectiveness. So, a patient in the Amazon or in China or in India can receive quality vision care and glasses.

The OneSight team brought a small high-tech device that fits on top of the patient's head. This device holds a liquid lens that provides an accurate eyeglass prescription

through a computer tablet.

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On a recent expedition to the Amazon, OneSight carried an entire clinic and glasses-manufacturing lab by boat. Equipment had to be lightweight and easily stowed. Instead of the traditional phoropter, a heavy and bulky piece of equipment that eye doctors use to determine which lenses are right, the team brought a small, high-tech device that mounts on a patient's head. It contains no actual lenses. Instead, it holds a liquid lens that, via a computer tablet and wireless and/or Bluetooth connectivity, provides an accurate prescription. Which meant the team also had to bring along some specialized portable satellite receivers for reliable internet.

"The phoropter we used," says Dr. Lane, "is from a technology called adaptive optics, which comes out of the space program. Instead of the traditional machine with a huge bank of lenses, the liquid lens changes shape at the computer's command." Other mobile equipment included tonometers for measuring fluid pressure inside the eyes, a retinal camera, retinoscopes, ophthalmoscopes, and a device Dr. Lane is particularly excited about called the Kaleidos. The Kaleidos tube is a binocular mobile

autorefractor and vision analyzer that measures the refraction of both eyes and discovers other ocular disorders.

The Kaleidos tube is a binocular mobile vision analyzer that measures the refraction of both eyes. The patient looks into the tube, and the system automatically makes readings of the eyes under ten seconds. With this device, OneSight can see close to 900 patients per day.

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"It's an objective way of measuring the patient's refractive error. All the patient does is look into the tube—and again it's tablet controlled—and the system will automatically make readings of both eyes simultaneously and take some other measurements which are necessary for the manufacturing of glasses. It does this in under ten seconds. Once the data is collected in the device at the end of the long light-standardizing tube, you can then push the information into the phoropter that sits on the patient's head. The basis of the prescription is then already in place, so that in many

cases all you need to do is confirm that the patient can actually see the equivalent of 20/20-size letters. Or you can refine the prescription immediately. Our data shows that the tube is delivering pretty close to the accuracy of a U.S.-trained eye doctor. In all likelihood, we'll soon be able to use it as a prescribing tool and then use the head-mounted phoropter for the exceptional cases."

The tube can be broken into smaller units in minutes for packing and carrying, and its data is easy for a technician to handle. Anywhere and anytime. So why don't all eye doctors use these now?

"I would say that it's not going to be long before that happens," Dr. Lane predicts. "This is really cutting-edge technology that is just becoming available, so I'm sure that over a period of time we'll see it being adopted. I think we're going to see a real explosion of technology, which will be disruptive, even though that's an overused word, of what's been around for the last 20 or 30 years. A doctor can be sitting right next to the patient, or 10,000 miles away and conducting the eye exam using the equivalent of a telemedicine platform."

Over in Johannesburg, Reshma Dabideen, OneSight's director of programming for Africa, reports that eye care there is in crisis. "Rates of blindness are up to seven times higher than the rest of the world. About 89 percent of the 36 million blind people in the world live in Africa and other developing nations."

Through robust mobile technology, OneSight is helping to bring vision care to the world. All of their software has been specifically designed to use minimal bandwidth to provide maximum consistency and effectiveness.

PHOTOGRAPH BY STEPHANIE SINCLAIR

How is OneSight meeting the challenge in Dabideen's region? "We have 39 permanent vision centers across five countries operating today, providing access to an eye exam and affordable pair of glasses to approximately 9.1 million people, including the entire country of the Gambia. Our trained Gambian team is now teaching people from Rwanda, Zambia, and Liberia how to provide vision care for their community. We have also established a manufacturing solution for each country that is run by people who already live there. We are particularly proud that we are able to develop local capacity and local capabilities so that Africans are teaching Africans."

The organization is planning to travel to 30 communities across the globe this year alone. Earlier this year, it hosted a clinic in Antigua to benefit those impacted by Hurricane Irma, thus furthering its mission not just in communities that lack access but in those that have had access taken away by natural disasters.

Still, the question remains—How far along are we in closing the vision-care gap? A few million served is a great effort, but can the movement really reach one billion people? OneSight is in the process of reevaluating plans right now with the consideration and impact of technology. With the Kaleidos tube device, the number of patients that can be seen is huge, with one device enabling between eight to nine hundred patients to be seen per day. This technology alone enables the organization's ability to scale. Given the right resources and the right schedule, OneSight believes they can close the vision care gap for good in about 30 years, and they are quite determined to do that.

Dr. Lane cites several countries that OneSight is focused on helping next. Madagascar, Mongolia, Indonesia, and the United States are among them. "We're going to be conducting a country evaluation of Nepal this year, in the form of a charitable clinic, which is usually a precursor to see if we can develop a sustainable set of eye care locations around the country. We'll also be in Mongolia next year. One of the things that came out of our clinic in the Amazon is that we're now actively investigating the ability to have a permanent presence there and expanding it so that we can serve other countries in the region."

What makes OneSight stand out? Says Dr. Lane, "OneSight has the solution to close the vision care gap in the U.S. and around the world. Our solution is adaptable, based on the individual needs of each community, and we are able to mobilize volunteers around the world to support our efforts. We focus on empowering communities to provide self-sustaining care. We also continuously stay on the pulse of new technologies and innovative strategies so that we can scale our solutions faster and reach communities that many would consider unreachable."

And so the work continues. The goal may be massive, but it is not impossible. Closing the vision care gap requires the dedication and support of people around the globe. Donate now and change a life





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