Emerging Technologies for Development

17 December 2020

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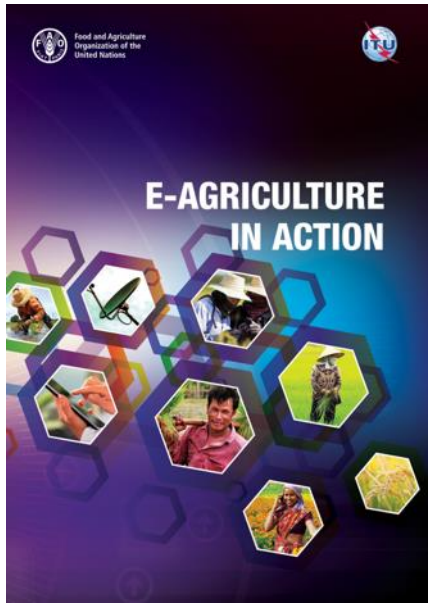
E-AGRICULTURE IN ACTION

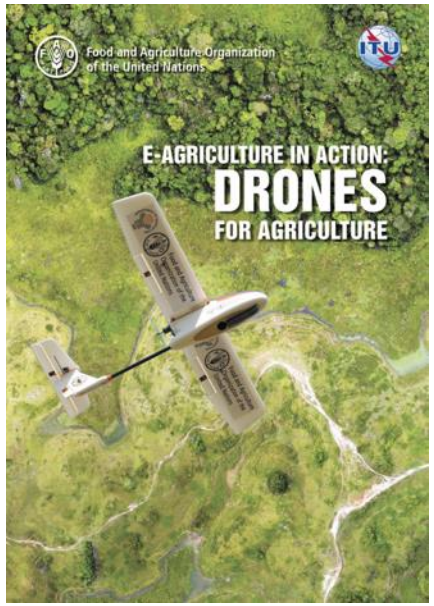
In 2016, FAO and ITU launched e-Agriculture in Action reports to highlight the use of ICT for agriculture and to promote successful, scalable, sustainable and replicable ICT for agriculture solutions

E-agriculture in Action Reports: 2016-2020

https://www.itu.int/en/ITU-D/ICT-Applications/Pages/e-agriculture-in-action.aspx



2018



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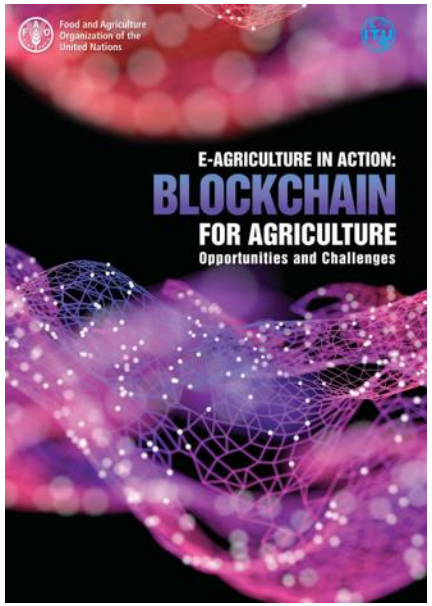

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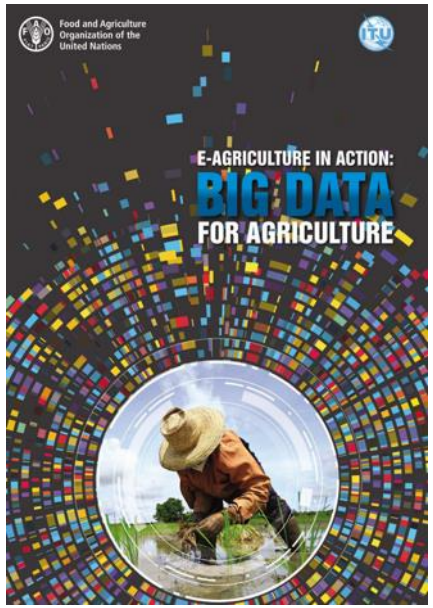


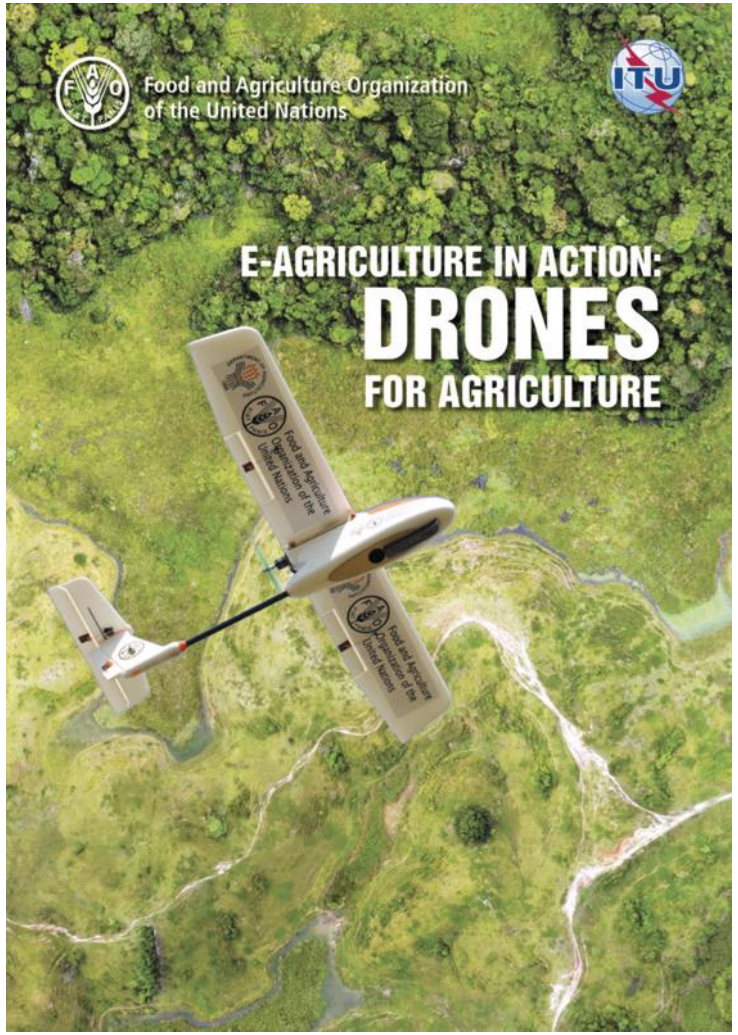
2019

Q1-2021

GENERAL

THEMATIC

E-Agriculture in Action Reports: Drones



"The use of unmanned aerial vehicles (UAVs), also known as drones, and connected analytics has great potential to support and address some of the most pressing problems faced by agriculture in terms of access to actionable real-time quality data."

ACTIONABLE INTELLIGENCE FROM DRONES TO THE AGRICULTURAL INDUSTRY

Experiences from SAP

Providing actionable intelligence to farmers:

- Crop surveying: aerial images of crops are captured regularly by drones and processed to record history of all agriculture action applied to crops. This allows to collect new evidence about outcomes of certain actions and processes
- Monitoring large cattle herds grazing over vast territories to detect:
  - pasture grass quality;
  - number of newly born calves;
  - predator attacks

E-Agriculture in Action Reports: Drones

DRONES-BASED SENSOR PLATFORMS

Experiences from TATA consultancy services (TCS)

Acquiring multispectral data for crop health monitoring, soil mapping, and irrigation. Combined with cloud-based data analytics, drones can help with early detection of water and nutrient stress and pest infestations. This ultimately ensures delivery of actionable insights to the farmers

- Crop health analysis
- Early detection of crop health problems
- Estimation of acreage

Drones in forest plantations

- Tree count and height
- Area and volume estimation

Wildlife conservation

- Kaziranga National Park (India) routine surveillance
- Anti-poaching operations
- Wildlife monitoring

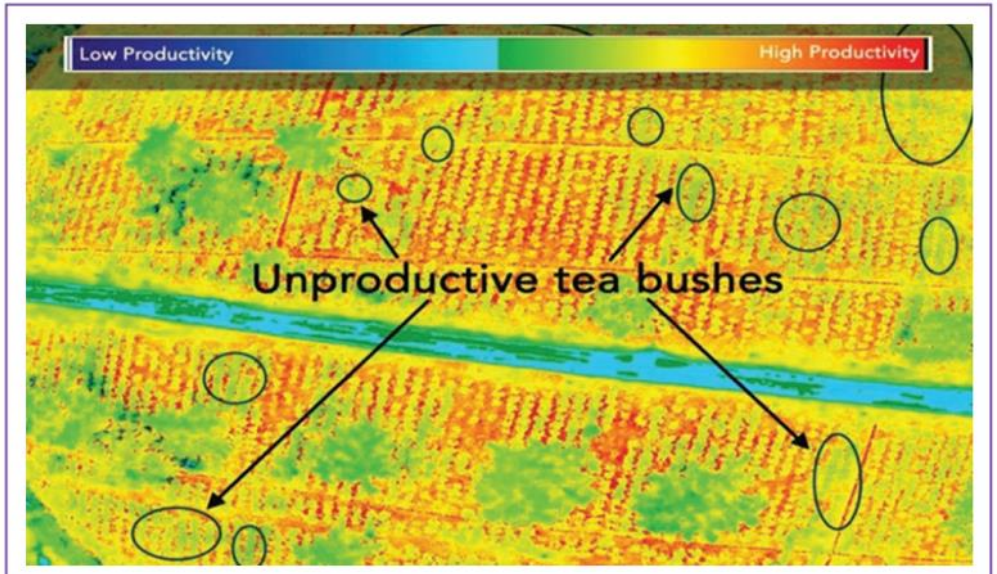


Figure E2. Tea plantation – health mapping using multispectral imaging by drones

© TCS

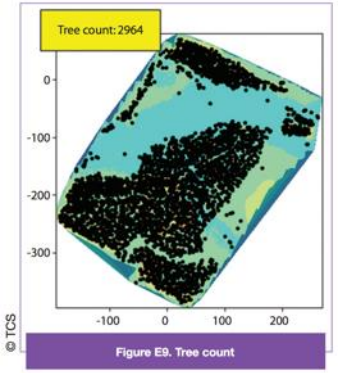


Figure E9. Tree count

© TCS

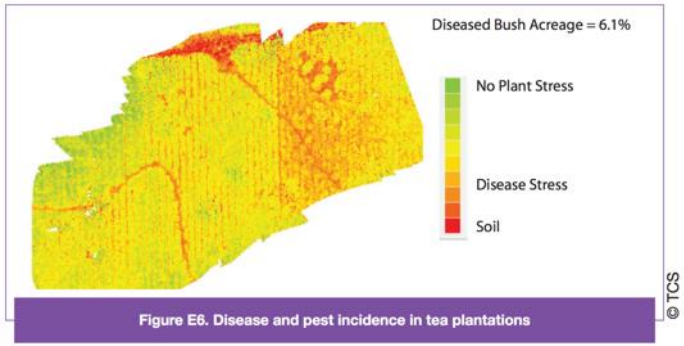


Figure E6. Disease and pest incidence in tea plantations

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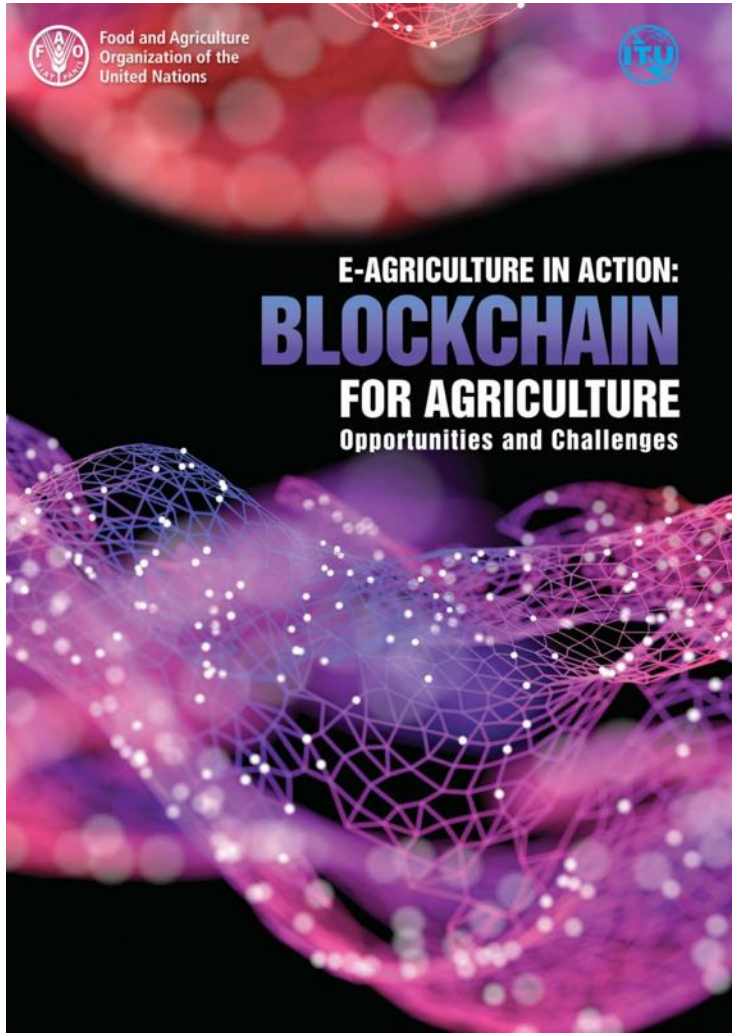
E-Agriculture in Action Reports: Blockchain



"This publication aims to demystify the technology, provide some thoughts on the opportunities and challenges in implementing blockchain-based systems as well as document some case studies on the use of blockchain for agriculture"

AGRIDIGITAL: BLOCKCHAIN FOR AGRI-SUPPLY CHAINS

Bridie Ohlsson from AgriDigital

- The AgriDigital platform streamlines and automates business processes for farmers and buyers
- Using the platform, the company's users can create contracts, deliveries, make payments, generate invoices and manage on-site inventory
- Settlement of a physical commodity on a blockchain: payment on title transfer for physical grain deliveries to a selected buyer
- Pilot tested in 2016

E-Agriculture in Action Reports: Blockchain

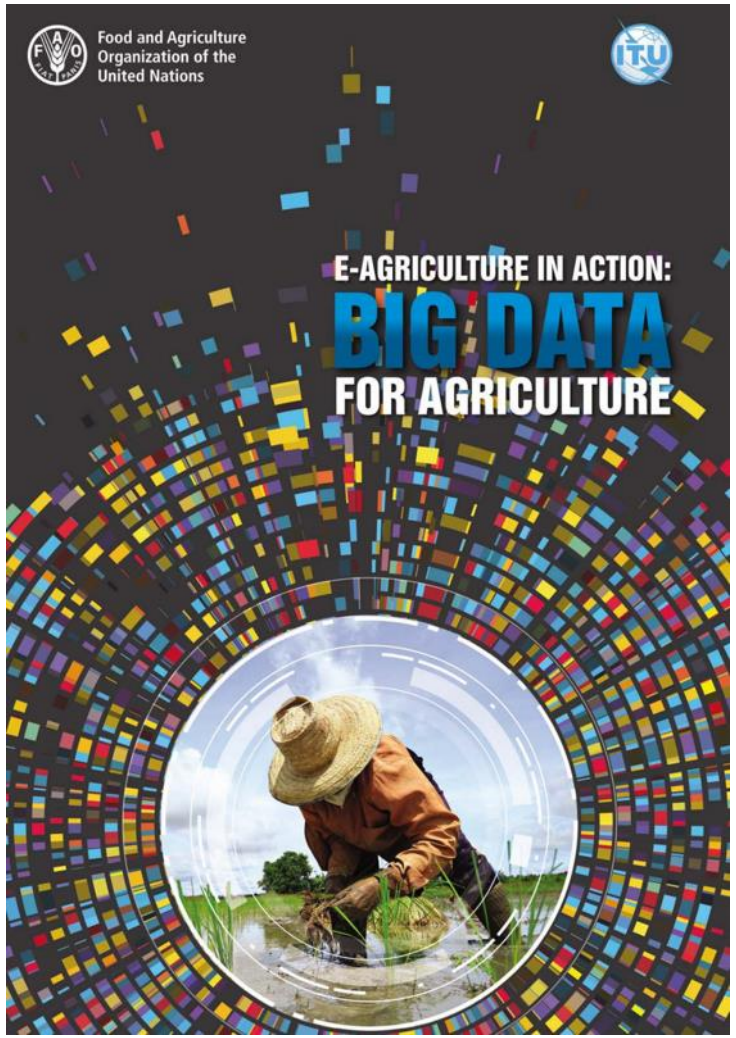
FARMS: FINANCIAL AND AGRICULTURAL RISK MANAGEMENT FOR SMALLHOLDERS

Violanda de Man from ICS

Blockchain-enabled insurance scheme with a 3-stage entry process.

- Uses virtual currency platforms integrated with remote sensing and mobile money solutions
- Based on farm hold information and local conditions, a suggestion is sent to farmers on the amount of money they need to set aside every year to mitigate risk
- Farmers set aside money by buying virtual currency “drought coins” that are kept in their personal mobile wallet account
- All transactions are communicated to the farmer, and participants can check their balance at any given moment through a universal SMS
- Farmers can withdraw their funds at the end of season and apply for loans

E-Agriculture in Action Reports: Big Data



"The challenges of extracting meaningful insights from various data streams to influence policy decision and/or provide actionable advisories for agriculture stakeholders are gaining prominence. This publication tries to shine some light on how various organizations address these challenges."

OLAM FARMER INFORMATION SYSTEM: IMPROVING SMALLHOLDER PRODUCTIVITY AND LIVELIHOODS

Zoe Maddison from Olam International

Olam Farmer Information System (OFIS) connects farmers to global economy

- Collect/record information on smallholder farms, surrounding landscape, social circumstances. Convert it into digital format
- Analyze data (and compare across different farms) to provide tailored advice to farmers about their needs
- Improve product traceability and transparency to reduce supply chain risk
- Distribute funding from sustainability partners more efficiently
- Platform has been rolled out in 27 countries
- Some cocoa farmers more than tripled their output using OFIS

E-Agriculture in Action Reports: Big Data

BIG DATA ECOSYSTEM FOR DISASTER RESILIENCE

Sanjay K Srivastva from ESCAP

Big data helps to address gaps in data flows before, during, and after a disaster.

- Flood forecasting based on climate modeling such as ensemble prediction system (EPS). Incorporates predictions from multiple weather centers and combines them with rainfall and river observations from different platforms and institutions to predict floods as early as 16 days ahead
- Better inform emergency and rescue operations based on analysis of social media posts and available images
- Rapid assessment of the damages based on satellite imagery, remote sensing imagery, and ground-collected data allows to rapidly programme support (used by World Bank after Salawesi earthquake)

Source: International Disaster Charter (2018)

Figure 12: Pre-and post disaster satellite images of Sulawesi's earthquake and tsunami affected area for damage assessment.

E-Agriculture in Action Reports: AI

"By helping to produce more with fewer resources, the AI could boost the efficiency of agriculture, making it more productive and profitable, helping it to attract investments and to provide social security guarantees to formal and informal agricultural workers, while also reducing the environmental burden."

XAG SMART AGRICULTURE SYSTEM

Olivia Zhou from XAG

XAG uses AI to assist farmers in making scientific decisions in time

- Uses drones to photograph high-definition digital fields and gathers data from inter-connected sensors on the ground to capture information about weather and soil
- Integrated AI system develops scouting plans and analyses images and data to detect issues (pests, water stress, etc.), optimize seeding, and estimate yields
- Used in Lithua Cotton Fram in China
- 12.7% increase in seedling emergence rate achieved

E-Agriculture in Action Reports: AI

PLANTIX – YOUR CROP DOCTOR: EVERY MONTH AROUND ONE MILLION FARMERS USE THE PLANTIX APP TO GROW HEALTHIER CROPS

Bianca Kummer, Karan Raut (Plantix) and Srikanth Rupavathara (ICRISAT)

Helping farmers detect plant damages that occur during crop production.

- Farmers with at least occasional access to smartphones can take pictures of plants and upload through the Plantix app
- The image is analyzed with the help of a deep neural networks to identify disease within seconds
- The app can identify over 500 pests, diseases, and nutrient deficiencies involving 50 crops with more than 85 percent accuracy (algorithms are continuously improved)
- The app offers crop management advice including symptoms and triggers and the biological and chemical control measures to alleviate yield loss
- App is available on Google Play Store and has been downloaded over 10 million times.
- Users report significant reduction in spending on plant protection chemicals and increases in crop yields

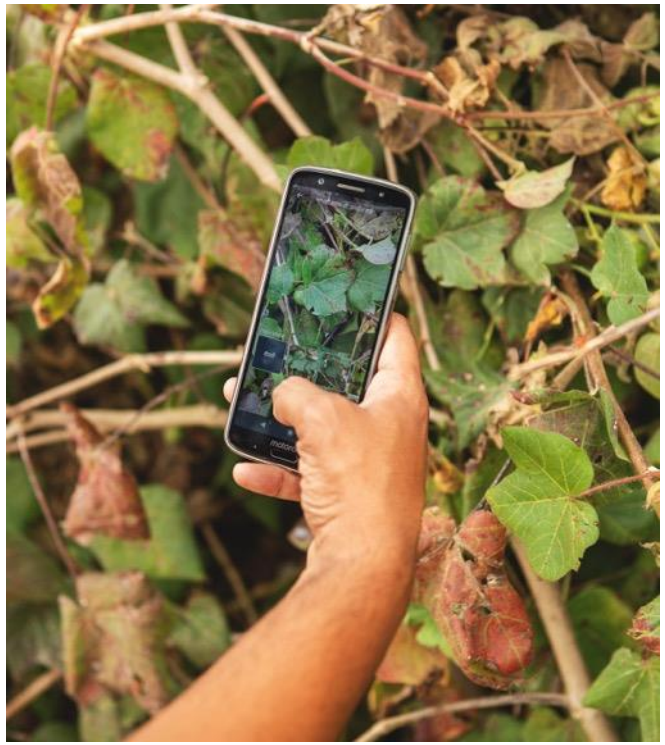


Photo credit: PLANTIX

AUTOMATED DETECTION OF DIABETIC RETINOPATHY IN SENEGAL

In 2019, ITU together with the Ministry of Health and Social Action and with support from a number of partners began working on a project to improve the coverage and quality of diabetic retinopathy screening in Senegal

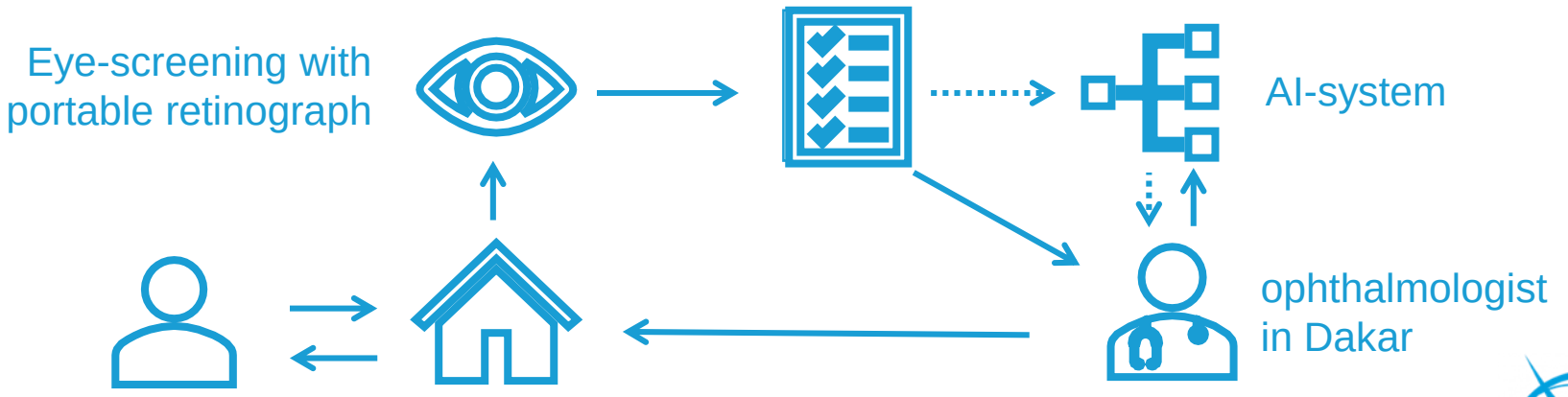
IMPROVING SCREEING COVERAGE

THE PROBLEM

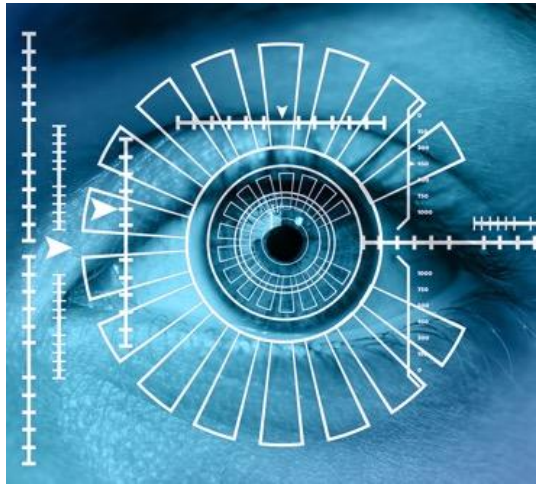
135,600 patients are at risk of diabetic retinopathy

89% of population have limited access to diagnostic services

THE SOLUTION



PILOT IN TWO CLINICS



Accelerating Digitalization of government services in resource-constrained countries

Implementing a model digital government platform based on reusable building blocks

- A whole-of-government approach to investing in shared digital infrastructure, supported by building blocks, can lead to more rapid scale-up of digital services with strong protection for citizen rights at a fraction of the cost.
- Limited resources require a whole-of-government architectural approach that takes advantage of economies of scale that are not available to ICT implemented in a piecemeal fashion.
- Governments need to keep pace with citizen expectations and increase IT agility without compromising security. **Architectural approaches should be used to move away from monolithic legacy systems where core data and services are siloed to more modular and components-based structures. Doing so can increase the speed of IT project delivery, leading to more efficient, cost-effective, responsive government**.

Collaboration between

Republic of Estonia
Ministry of Foreign Affairs

Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung

ITU

dial Digital Impact Alliance

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

ITU

https://www.itu.int/en/ITU-D/ICT-Applications/Pages/digital-government-model-platform.aspx

Thank You!