
Reveal
REDEFINING PRECISION
Geoenabling microplanning and delivery of health campaigns:
AKROS

THE CHALLENGE: REACHING THE UNREACHED

"Locating rural villages and homes on the ground is challenging… to better deliver services, we need to understand where people live and verify those services have been delivered."
- District Health Officer, Zambia

1. Although reported coverage may be high, true coverage is often actually quite low.[1,2,3]
2. Planning and delivery of campaigns is often impeded by outdated or unavailable population data, and the inability to ensure services actually reach people.
3. Good news: technology is providing an opportunity to map populations and settlements using satellite imagery, microplan strategically, and improve delivery.

(1) Mumbengegwi DR, Sturrock H, Hsiang M, et al. Is there a correlation between malaria incidence and IRS coverage in western Zambezi region, Namibia?. *Public Health Action*. 2018;8 Link
(2) Larsen DA, Borrill L, Patel R, Fregosi L. Reported community-level indoor residual spray coverage from two-stage cluster surveys in sub-Saharan Africa. *Malar J*. 2017;16(1):249. Link
(3) Bridges, D.J., Pollard, D., Winters, A.M. *et al.* Accuracy and impact of spatial aids based upon satellite enumeration to improve indoor residual spraying spatial coverage. *Malar J* 17, 93 (2018). Link
(4) Analysis of WHO PCT Databank and Global Health Observatory data (accessed September 2019)
(5) UNICEF. Vaccination and Immunization Statistics 2021 [cited 2021 Aug 25] Link
(6) WHO, UNICEF. Progress and Challenges with achieving universal immunization coverage. Geneva, Switzerland; 2020 June p 1-25. Report No1. Link
(7) Kainga HW, Ssendagire S, Ssanyu JN, et al. Proportion of children aged 9–59 months reached by the 2017 measles supplementary immunization activity among the children with or without history of measles vaccination in Lilongwe district, Malawi. 2021; PLOS ONE 16(1). Link.

END TO END GEO-ENABLED CAMPAIGN PLANNING, DELIVERY AND ANALYSIS

1 MAP & MICROPLAN

Reveal
REDEFINING PRECISION

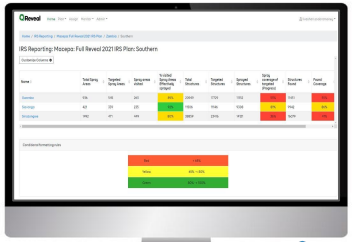
ramp
POPULATION EXPLORER™
Google

Outcome: Established denominator. Aligned strategy for HR and commodities. Paper based or digital microplanning.

2 NAVIGATE & DELIVER

Outcome: Execution of plan. Interventions delivered even to last mile communities.

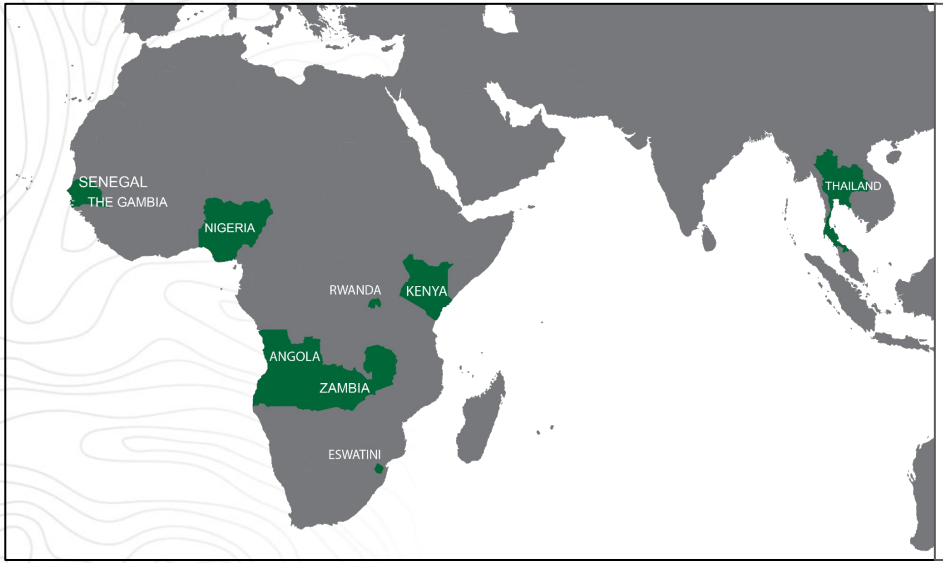
3 MONITOR & RESPOND

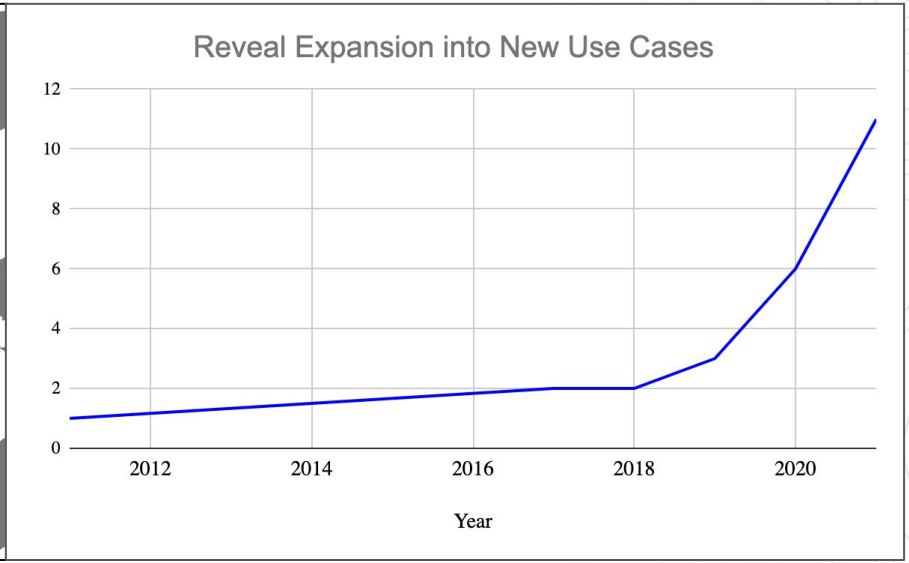


dhis2

Outcome: Visualize true coverage, data-driven guidance, directed mop-ups. Integrates with DHIS2.

REVEAL HAS GROWN INTO NEW COUNTRIES AND USE CASES



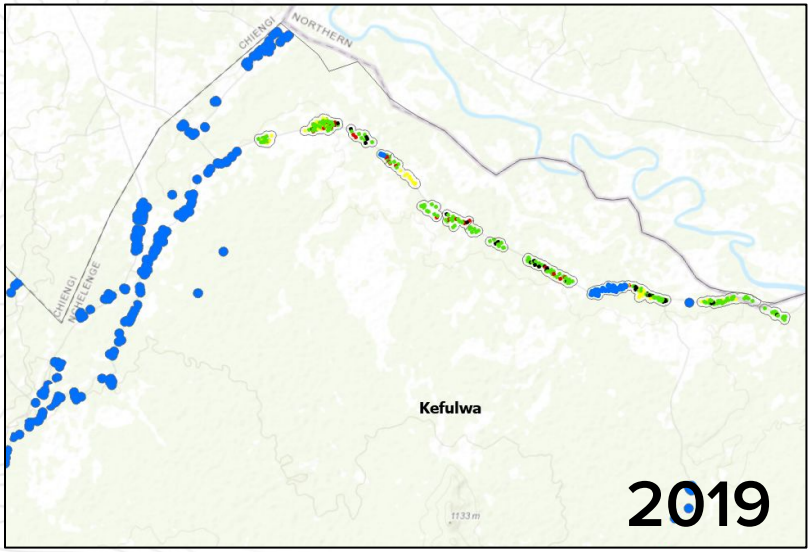


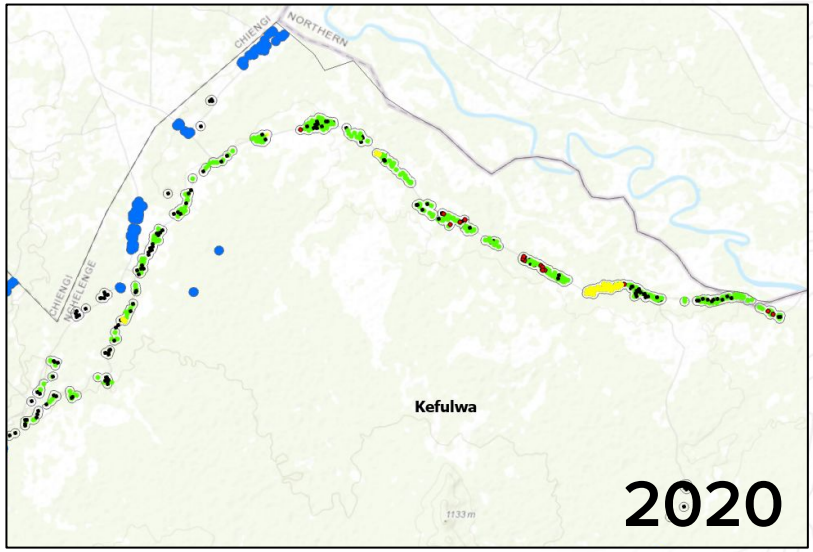
REVEAL & INDOOR RESIDUAL SPRAY (IRS)

Where:	Angola, Zambia, Namibia, Senegal
What:	Use of paper and digital maps for microplanning. IRS teams use in-field monitoring and mop-up functionality within Reveal.
Results:	• Improved understanding of gaps in campaign delivery. • Increased IRS coverages by 20-30%. [2] • Reduction in malaria incidence by 15% (comparing IRS alone to IRS + Reveal) [2] • Reduced cost per malaria case averted by 63% ($118 → $44) [3]
Next:	• Deploy combined IRS and ITN planning and targeting approach. • Scale integration of GRID3 data products with Reveal • Scale Reveal to additional PMI and Global Fund countries for IRS • Digitized macro and microplanning process to improve data use for critical resource planning

1. Larsen et al (2020). Leveraging risk maps of malaria vector abundance to guide control efforts reduces malaria incidence in Eastern Province, Zambia. Nature Scientific Reports. 10: https://www.nature.com/articles/s41598-020-66968-w
2. Center for Applied Malaria Research at Tulane University. Retrospective Evaluation of the Effectiveness of Indoor Residual Spray with Pirimiphos-Methyl (Actellic) on Malaria Transmission in Zambia. January 2017.
3. Tropical Health (Josh Yukich). Cost and cost-effectiveness of 3GIRS in sub-Saharan Africa: results of data collection and analysis in the nGenIRS project. January 2019.

SPRAY COVERAGE/SUCCESS IN 2019 (82.5%) VS. 2020 (93.3%)



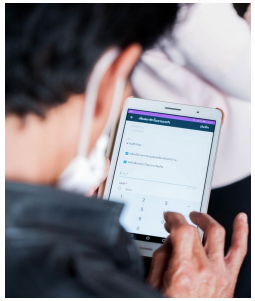


- Kefulwa, previously unreached areas - it was believed very few houses were located here
- However, maps created in 2019 showed these unreached areas
- In 2020, IRS was deployed to these areas
- Structures in this rural, hard-to-reach, inland area now “green” indicating that they received spray

Reveal

REVEAL & FOCI INVESTIGATION

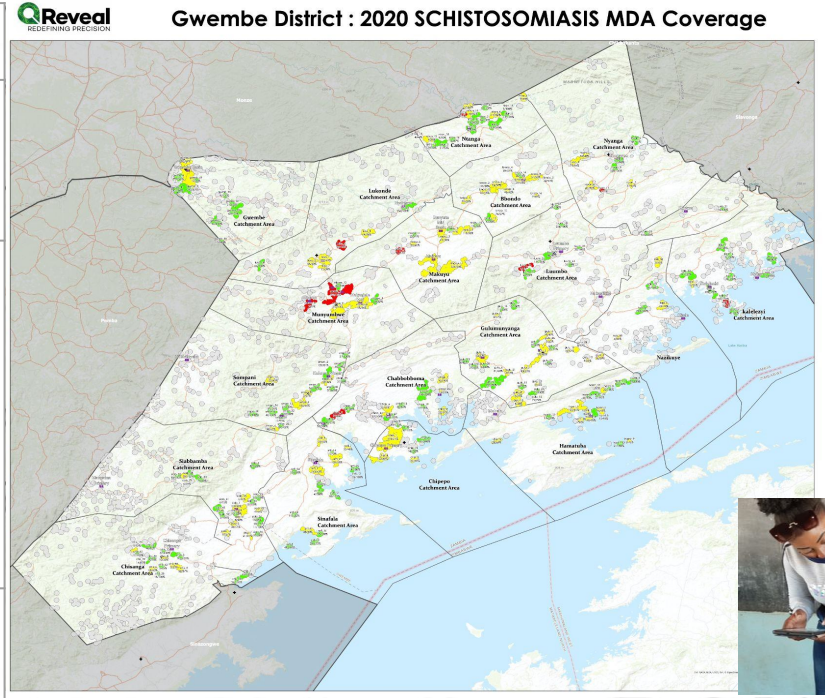
Where:	Thailand
What:	Reveal is now the primary platform to conduct foci investigation in Thailand. Reveal is aligned to Thailand's geographic focus areas, is integrated with the country case management system, and supports delivery of larvae collection, entomological studies, reactive case detection, delivery of LLINs and IRS.[1] Initial pilot, 3 provinces: Ubon Rachithani, Tak, and Trat.
Results:	• Decreased time lag between reporting and data usability from two days to two hours • Increased the spatial resolution from the focus down to the household and individual • Significantly increased the visibility of the drivers of transmission and programmatic coverage of the different elimination activities within each focus
Next:	Expand foci investigation support to other countries within the Asia Pacific Malaria Elimination Network



(1) https://storymaps.arcgis.com/stories/6edfe59250e24fcaa923d614f6110fe7?fbclid=IwAR2XakaIK7tHS8jTPxKX3-roM0l1QqqEgyMguNmO0kKbaI-YrtjBLpydnd8

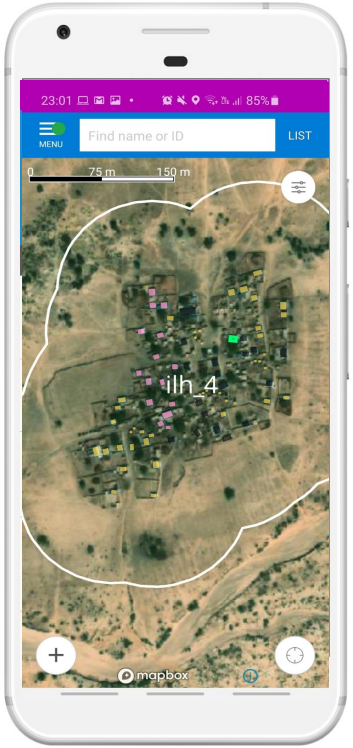
REVEAL & MASS DRUG ADMINISTRATION (MDA)

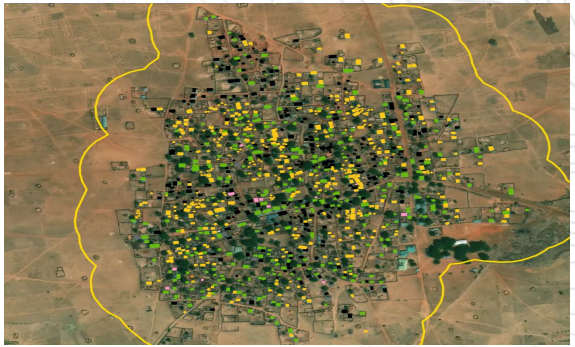
Where:	Kenya, Mali, Zambia
What:	Reveal supports MDA campaigns for malaria and neglected tropical diseases including onchocerciasis, lymphatic filariasis, schistosomiasis and soil transmitted helminths.
Results:	Supports the use of paper-based and digital maps to plan commodities and staff necessary for MDA campaigns. Support delivery of MDA campaigns at household-level or point-based delivery. Positive feedback on tool usability. Noted data quality improvements. Improved data use for monitoring and decision-making.
Next:	Support backend development to improve syncing between campaign rounds. Scale with multilateral partners.



REVEAL & SEASONAL MALARIA CHEMOPROPHYLAXIS (SMC)

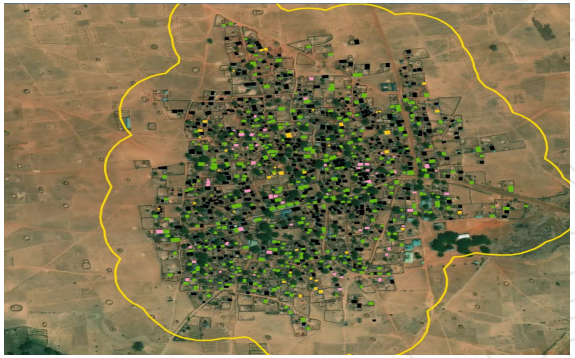
Where:	Nigeria
What:	Planning and delivery of SMC, monthly doses of antimalarial drugs to children during peak malaria season. Coordinate community drug distributors' (CDDs) field movements. Monitor real time coverage of SMC.
Results:	• Usability testing and live-fire field testing in (2020/2021) showed usefulness, efficiency and learnability of the Reveal platform across health facilities in Sokoto State, Nigeria. • Challenges were overcome (updated server syncing times from hours to minutes). Upgraded dashboards. Proof of concept achieved and strong user experience. • Significant Improvements of visitation and distribution coverage from Cycle 1 to Cycle 3.
Next:	Mature the platform's data model in order to streamline data processing and persistence, which are key to long-term scalability and interoperability.





Cycle 1
Visitation
Coverage: 54%

Distribution
Coverage: 78%



Cycle 3
Visitation
Coverage: 93%

Distribution
Coverage: 87%

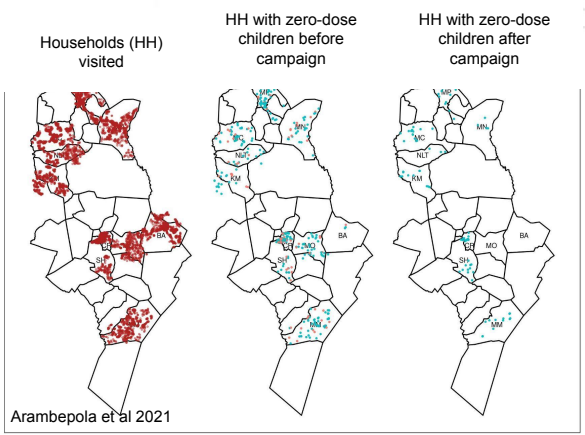
Federal Ministry of Health

malaria consortium
disease control, better health

Digital Impact Alliance

REVEAL & IMMUNIZATIONS

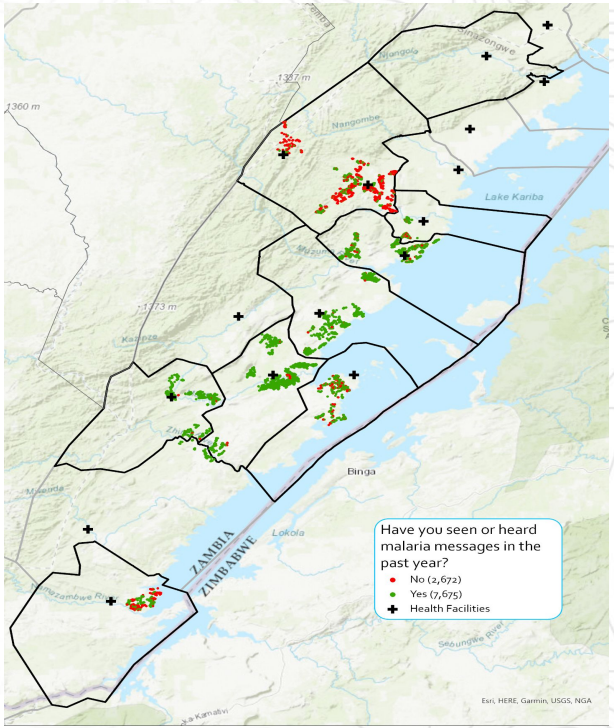
Where:	Zambia
What:	Reveal was used to understand location of zero dose children (DTP or measles) and to monitor whether these children received vaccinations during the seasonal immunization activity. (1) Pre-registration of all children in all houses; (2) Post campaign, Reveal was used to return to only those houses with zero-dose children to confirm if they had been vaccinated during the campaign. (3) JHU has used the finite geospatial data to develop a geospatial model to help predict locations of zero dose children. (4) Initial pilot: GCE grant; Currently applying for round 2 GCE grant to drive targeted vaccination campaigns to zero-dose children.
Results:	• 26% of measles zero-dose children were not reached during the mass vaccination campaign.[1] • Of those zero-dose children not reached during the campaign, 96% were found and vaccinated during the mop-up activities. • Tangible opportunity to support campaign targeting towards those children left behind through sub-district targeting and microplanning of vaccination and child health services.
Next:	Support targeted vaccination campaigns through Reveal platform. Expand approach to other vaccination campaigns (including COVID, RTS-S) and child health more broadly.



1. Arambepola et al. 2021. Using geospatial models to map zero-dose children: Factors associated with zero-dose vaccination status before and after a mass measles and rubella vaccination campaign. BMJ Global Health. In Review.

REVEAL & SOCIAL BEHAVIOR CHANGE (SBC)

Where:	Zambia
What:	SBC questions were used within Reveal to assess the level of awareness of malaria messages, the type of messages received, and preferred communication channels of communities. Health service delivery gaps were exposed and application of this platform for data driven approach to target SBC activities.
Results:	• During an IRS campaign, SBC was successfully captured simultaneously from houses visited • Localized gaps in malaria messaging were described • Proof of concept established, future implementations could use this approach to then provide targeted messaging.
Next:	Continue to understand SBC gaps during other health campaigns. Provide Reveal for field teams to distribute SBC materials to fill gaps in a targeted manner.



Republic of Zambia
Ministry of Health

MACEPA PATH
Malaria Control and Elimination Partnership in Africa

Digital Impact Alliance

END TO END GEO-ENABLED CAMPAIGN PLANNING, DELIVERY AND ANALYSIS

1 MAP & MICROPLAN

Reveal
REDEFINING PRECISION

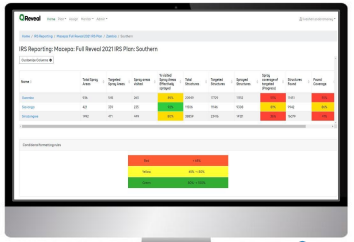
ramp
POPULATION EXPLORER™
Google

Outcome: Established denominator. Aligned strategy for HR and commodities. Paper based or digital microplanning.

2 NAVIGATE & DELIVER

Outcome: Execution of plan. Interventions delivered even to last mile communities.

3 MONITOR & RESPOND



dhis2

Outcome: Visualize true coverage, data-driven guidance, directed mop-ups. Integrates with DHIS2.

WHAT IS THE IMPACT OF REVEAL?

1. Increased health campaign coverages by 20-30%.[1]
2. Reduction in malaria incidence by 15% (comparing IRS alone to IRS + Reveal).[2]
3. Reduced cost per malaria case averted by 63% ($118 → $44).[3]
4. The ROI associated with the use of Reveal is significant – for every dollar spent, use of Reveal prevents nearly 3 times the number of cases compared to the intervention alone.

Reveal

1. Larsen et al (2020). Leveraging risk maps of malaria vector abundance to guide control efforts reduces malaria incidence in Eastern Province, Zambia. Nature Scientific Reports. 10: 10307 https://www.nature.com/articles/s41598-020-66968-w
2. Keating, J., Yukich, J.O., Miller, J.M. *et al.* Retrospective evaluation of the effectiveness of indoor residual spray with pirimiphos-methyl (Actellic) on malaria transmission in Zambia. *Malar J* 20, 173 (2021). https://doi.org/10.1186/s12936-021-03710-5
3. Tropical Health (Josh Yukich). Cost and cost-effectiveness of 3GIRS in sub-Saharan Africa: results of data collection and analysis in the nGenIRS project. January 2019.

END TO END GEO-ENABLED CAMPAIGN PLANNING, DELIVERY AND ANALYSIS

1 MAP & MICROPLAN

Reveal
REDEFINING PRECISION

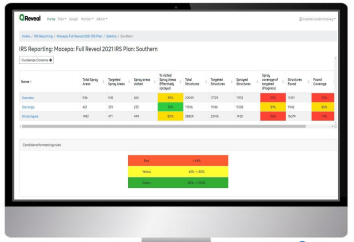
ramp
POPULATION EXPLORER™
Google

Outcome: Established denominator. Aligned strategy for HR and commodities. Paper based or digital microplanning.

2 NAVIGATE & DELIVER

Outcome: Execution of plan. Interventions delivered even to last mile communities.

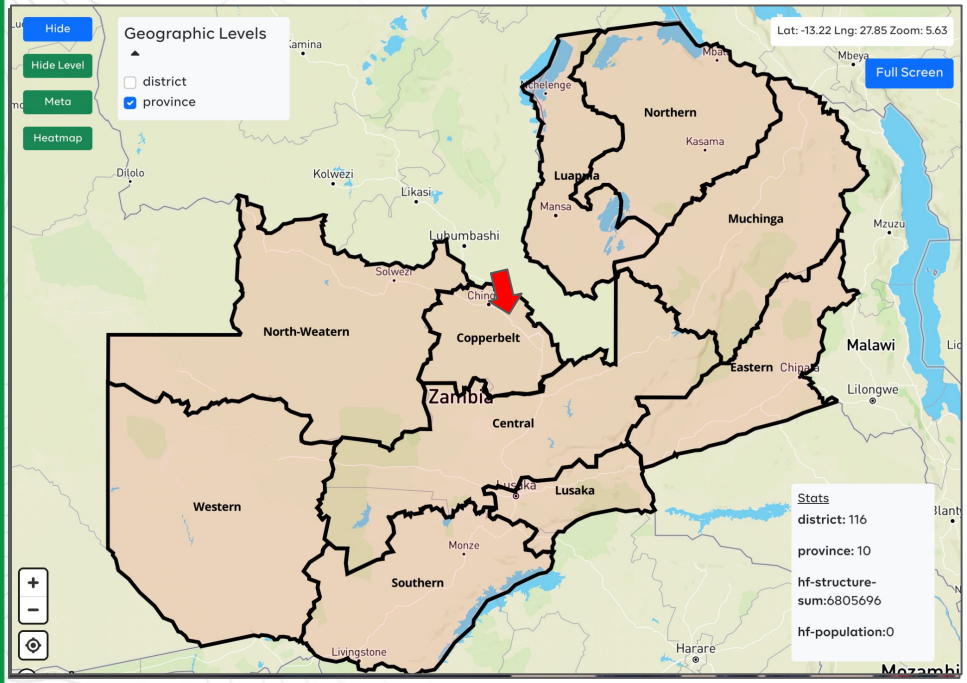
3 MONITOR & RESPOND



dhis2

Outcome: Visualize true coverage, data-driven guidance, directed mop-ups. Integrates with DHIS2.

Demo Scenario



- I am the Luanshya district level manager tasked to deploy the IRS the campaign
- The national program has allotted me resources to spray only 10,000 structures
- I have 5 spray teams available for the campaign
- I must select the health facility catchments where I will target the campaign
- I must deploy the 5 spray teams to conduct the IRS campaign

Selection criteria for target areas:

1. Low coverage in previous years
2. High incidence
3. High population

Reveal

Demo

WHAT ARE GOVERNMENTS SAYING ABOUT REVEAL?

“I am convinced that this is a great resource especially with a global emphasis on real time data for decision making, targeting of interventions, and best use of resources.”

Dr. Elizabeth Chizema
RBM Partnership Board and ALMA’s End Malaria Council Secretariat Officer

The Reveal pilot projects in Nigeria have resulted in the development of a tool that **adds substantial value to SMC campaigns**. In particular, we are **interested in its geospatial functionality, which could transform SMC campaign planning and coordination**. We are also excited about the role a geospatial tool could play in ensuring that hard-to-reach and vulnerable populations can benefit from this life-saving intervention.

Malaria Consortium

“With traditional IRS, what happens is we just go and spray in the field and there's no direction or efficiency in the way we're spraying. Sometimes we may count numbers and say "okay, we've sprayed so many structures" but if you look at the density in the catchment areas where we've sprayed -- if you don't hit about 90% of the structure, you won't know without Reveal because that means is you'd be leaving out a lot of the structures, which would not accord much protection to the households as a whole.”

Dr. Adamson Ndolovu
Katete District Health Director, Zambia

"We know that there is no cheating this program, we know that that structure has really been sprayed. No one can really cheat. There is nothing like falsifying the data. The data which is coming from the program is the correct data. It helps us with making decisions.”

Jerry Maambo
IRS Manager, Katete District, Zambia

November 2019

Does Reveal require a license?

NO. There is no license or fees to continue to use Reveal. Reveal is open source.

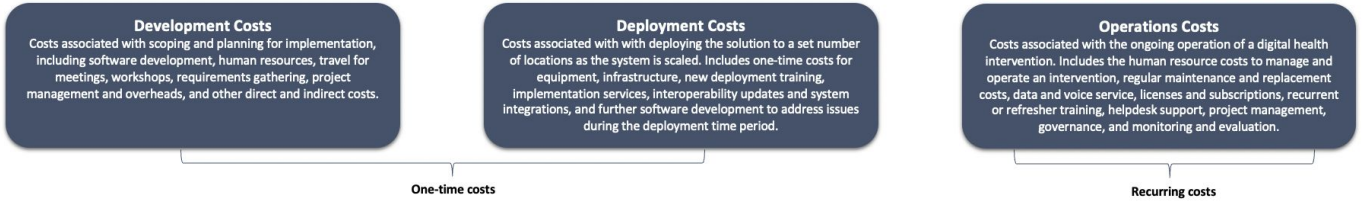
Source code:

Reveal source code is readily available here:

https://github.com/akrosinc

Reveal

What are the cost drivers?



- **Mobile devices → Individual CDD/CHW or Supervisor model; BYOD an option**
- **Training →**
  - Master training (3 days national level)
  - Validation meeting (Test prior to campaign)
  - TOT for local teams (2 days)
  - Cascade training to community level (1 day)
- **Local support staff → Not full time positions, use existing capacity, or build capacity over time**
  - Reveal Program Coordinator
  - GIS Capacity*
  - DevOps*
  - Software*

What is the Reveal Stack?

- Java Spring
- Android Mobile Client
- React JS
- PostgreSQL
- Apache Kafka
- Apache Spark
- Elasticsearch

Reveal

What hardware is required for the Reveal mobile application?

Hardware:

- The platform is Android-based and can be used on smartphones or tablets.
- Reveal cannot be used on feature (“dumb”) phones.

Cost:

The cost depends on how many people will use the mobile application and which device.

- Household data collection: every CDD/CHW will need a device.
- Health facility-level data collection: CDD/CHW supervisors need a device.

Here are examples of hardware used in Reveal campaigns:

- Galaxy A03 Core phones *used in Kenya
- Samsung Galaxy A30
- Samsung S6
- Samsung Galaxy Tab A
- Samsung Galaxy Tab 3
- Techno DroidPad 7D ProLTE
- Tecno Camon 15
- Mara phone X1

What is the integration capacity of Reveal with 3rd party products?

Reveal can integrate with 3rd party products via the use of an API.

- Integration could include just the microplanning module, or the full end to end workflow.
- The roadmap includes an integration mapping tool to allow mapping between different DHIS2 instances, but this plan is not yet funded.

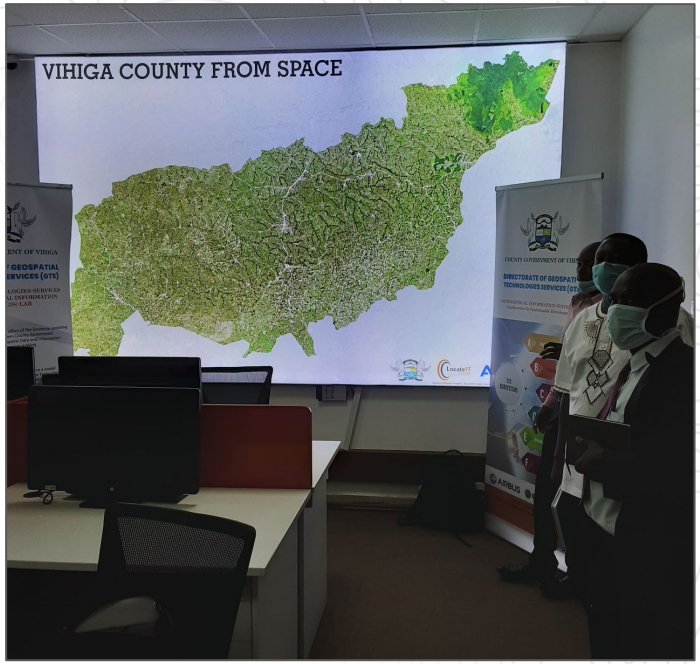
Reveal

awinters@akros.com

Thank you!

www.akros.com

www.revealprecision.com



AKROS

digital square

Digital Public Goods Alliance

Google for Startups

World Health Organization

Digital Health Atlas