

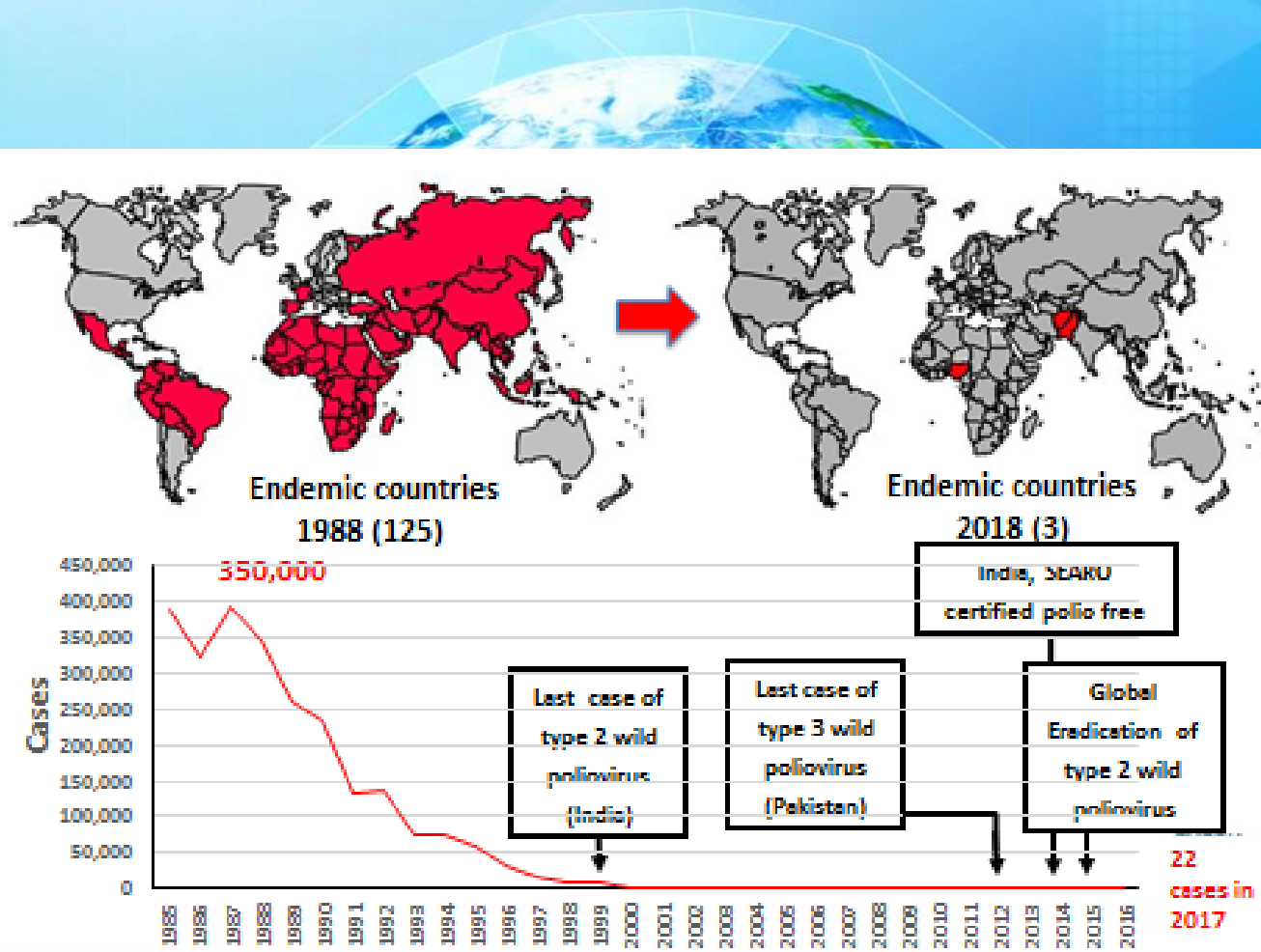
Crowd Sourcing for Public Health Emergencies

Ravi Shankar Santhana Gopala Krishnan,
Technical Officer, World Health Organization

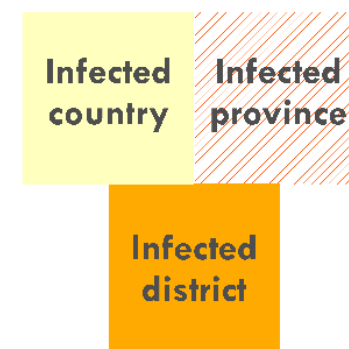
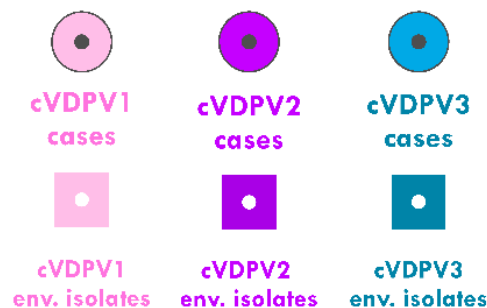
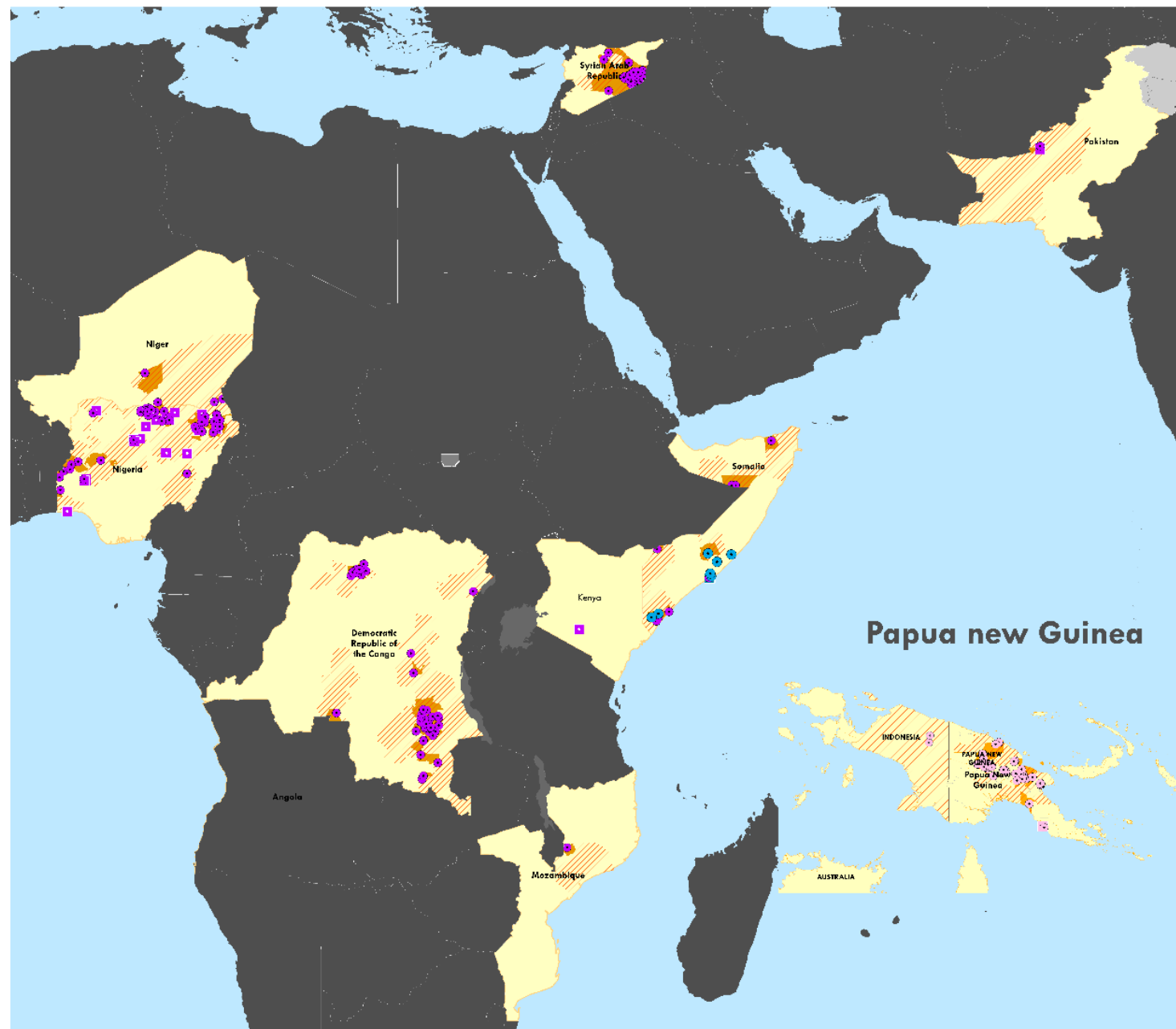
Plenary Presentation



Global polio eradication progress 1988 - 2019



Global cVDPV cases and environmental positive isolates reported post switch



Dot represents cVDPV1,2 & 3 cases randomly distributed within the second administrative level and the time period is based on the date of onset of the cases. The environmental sites are represented to the closest location of the sample collection and the time period based on the collection date of the sample.

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Map Scale (A3): 1:20,000,000

1 cm = 200 km

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Children who are affected by polio may be..

- Unreachable
- Inaccessible
- Hard to find



Marginalized by society



Unaware polio is preventable



Escaping war



Living in remote places

**Vaccines that
protect against
polio have to be
carefully
maintained and
administered**



Kept between 2-8°



**Administered by a
vaccinator**



**Transported to places that
may be remote, insecure,
inaccessible**



After a vaccination campaign, representative surveys are conducted to ensure all children are reached; these are conducted in conditions that are..



Challenging



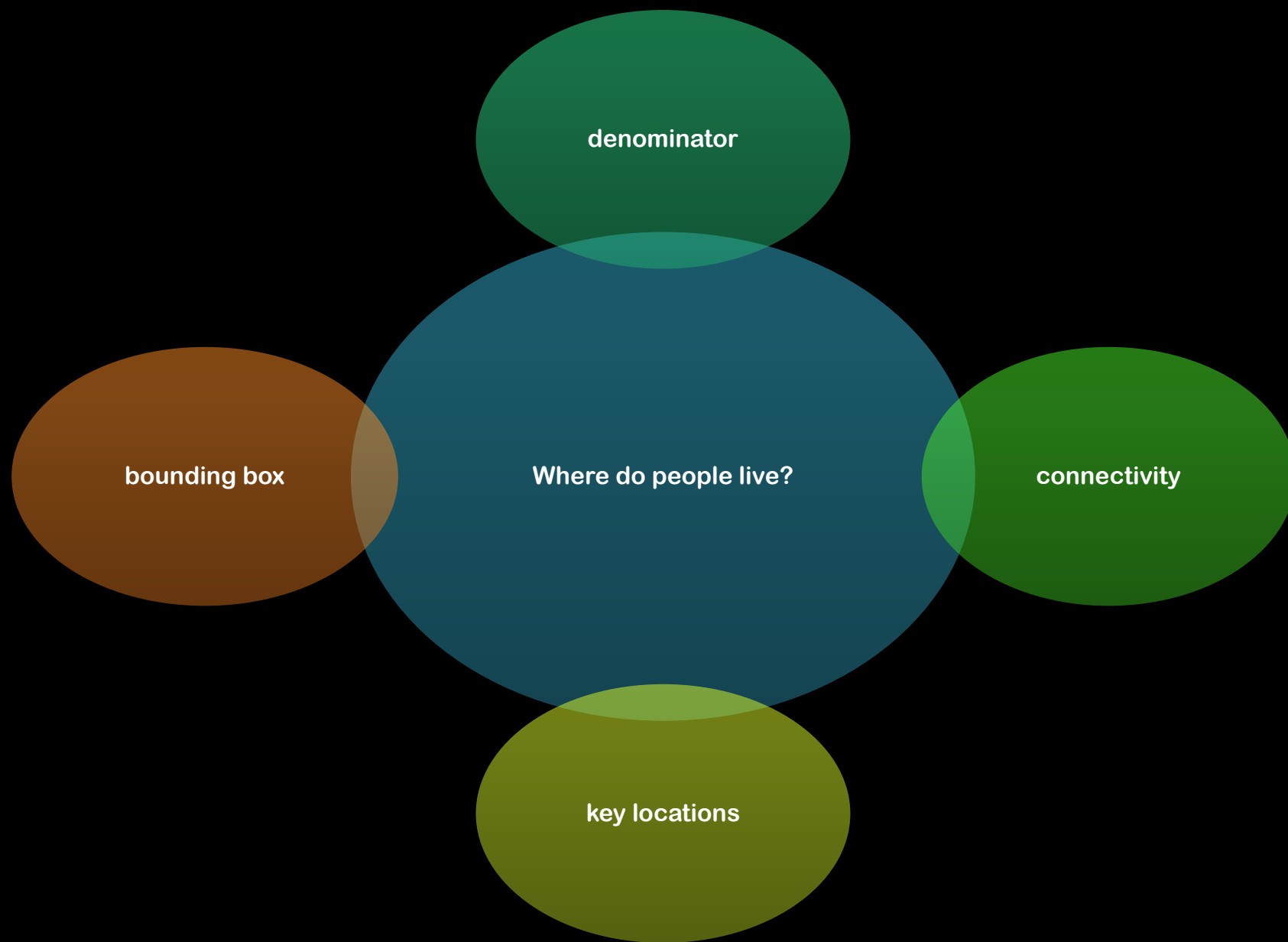
Remote



Hard to locate



Difficult to access



**Can crowd-sourcing help us to
understand where children live?**

**Mapathons
were used as a
means to
reach the
unreachable**

Have you ever participated in a Mapathon?



Save the Date: January 19-21, 2018

We will be holding a mapathon! Please stay tuned for more information coming soon.

Join the fun from right behind your computer!

Participants will be using high resolution imagery to improve the quality of a **polio campaign** by identifying building points for eradicating polio.

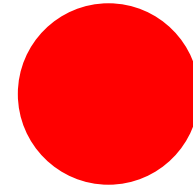
This is a closed mapathon hosted by WHO and CDC. Your commitment will be essential to making this effort successful.



**World Health
Organization**



**What is a
mapathon?**



**How this is
done?**



**How this is
done?**



**How this is
done?**



**How this is
done?**



How this is
done?



**How this is
done?**



**How this is
done?**



How this is
done?



Mapathon results

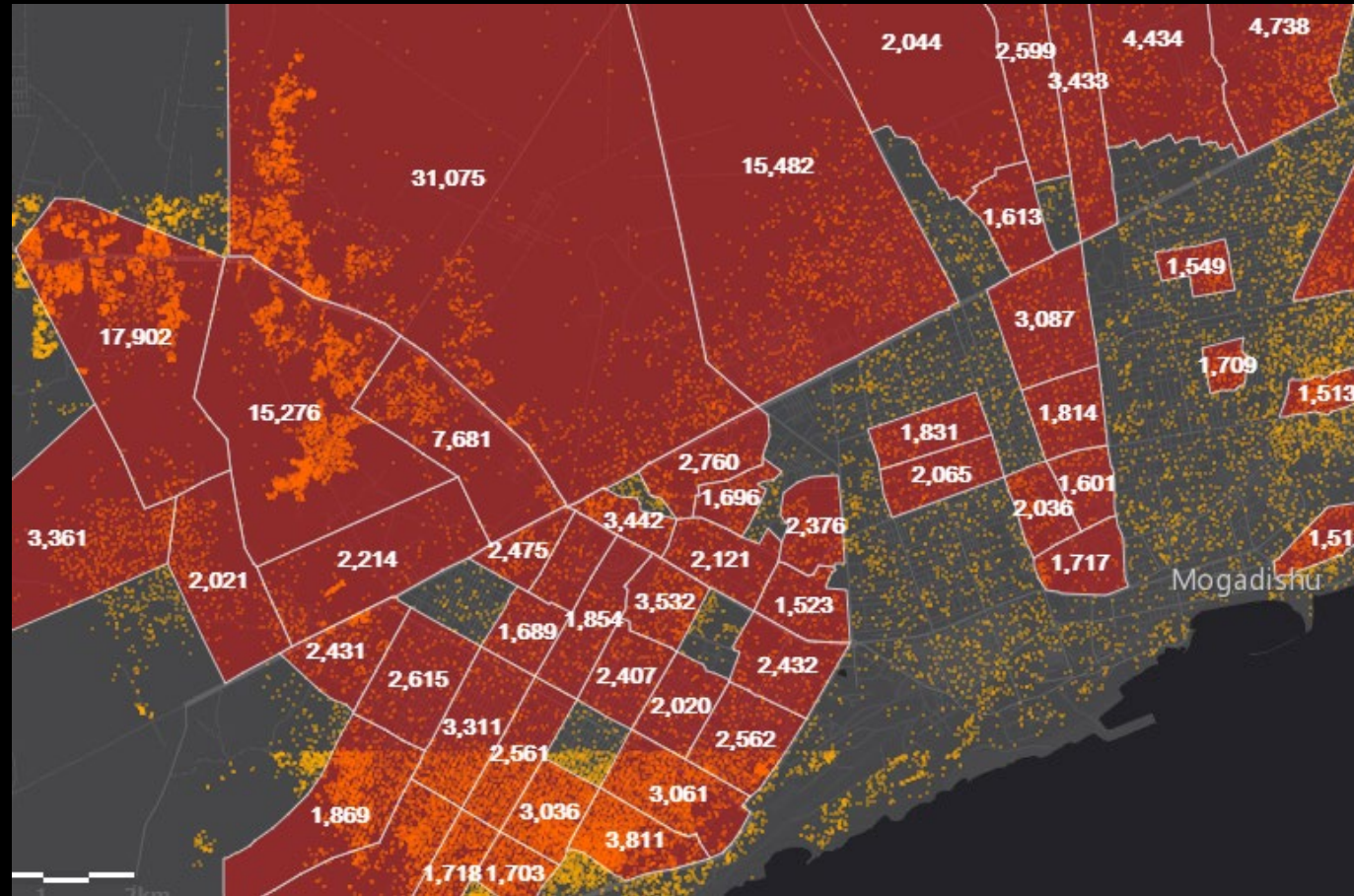


**Friday 19 - Mon 21 Jan, 2018
over 72 hrs
338,953 structures mapped.**

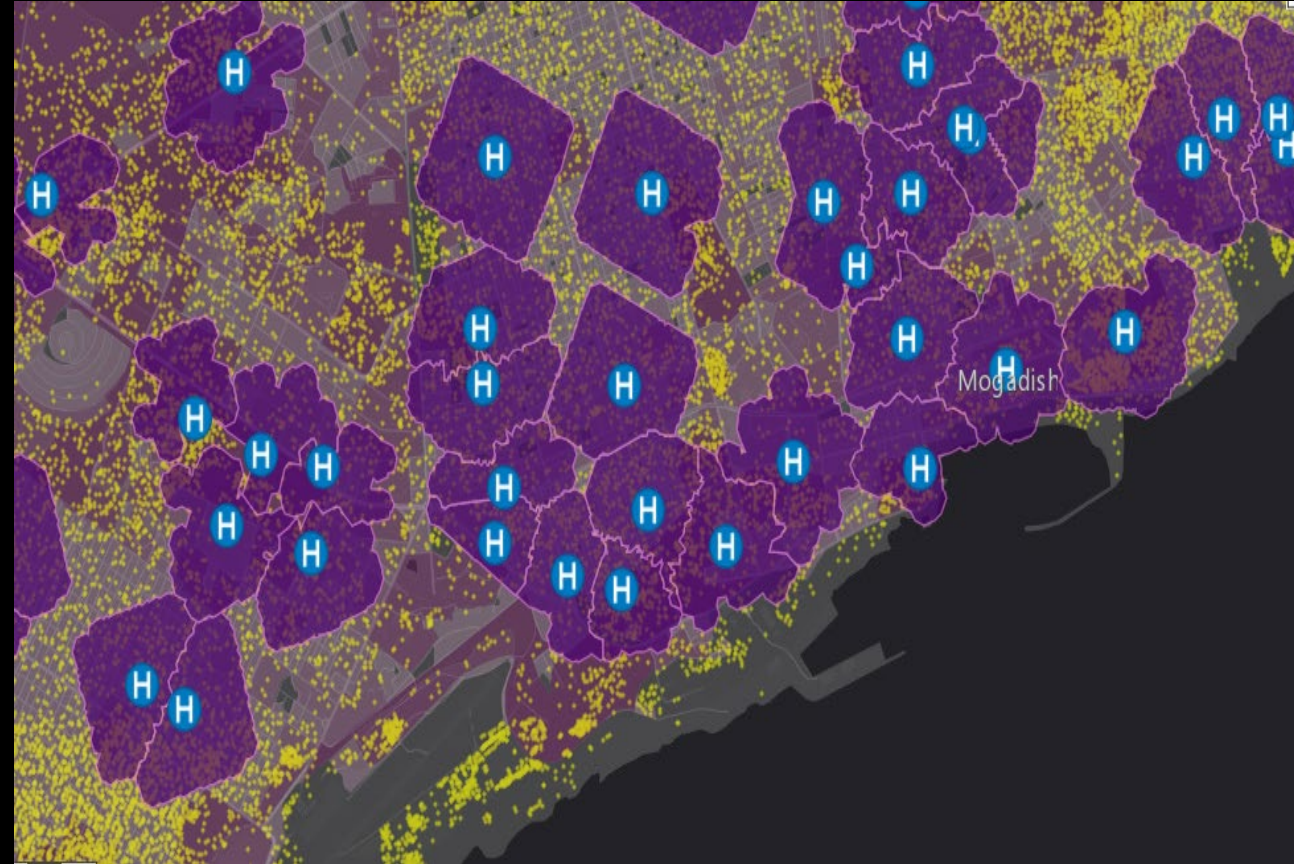
Mapping of DFA and team areas

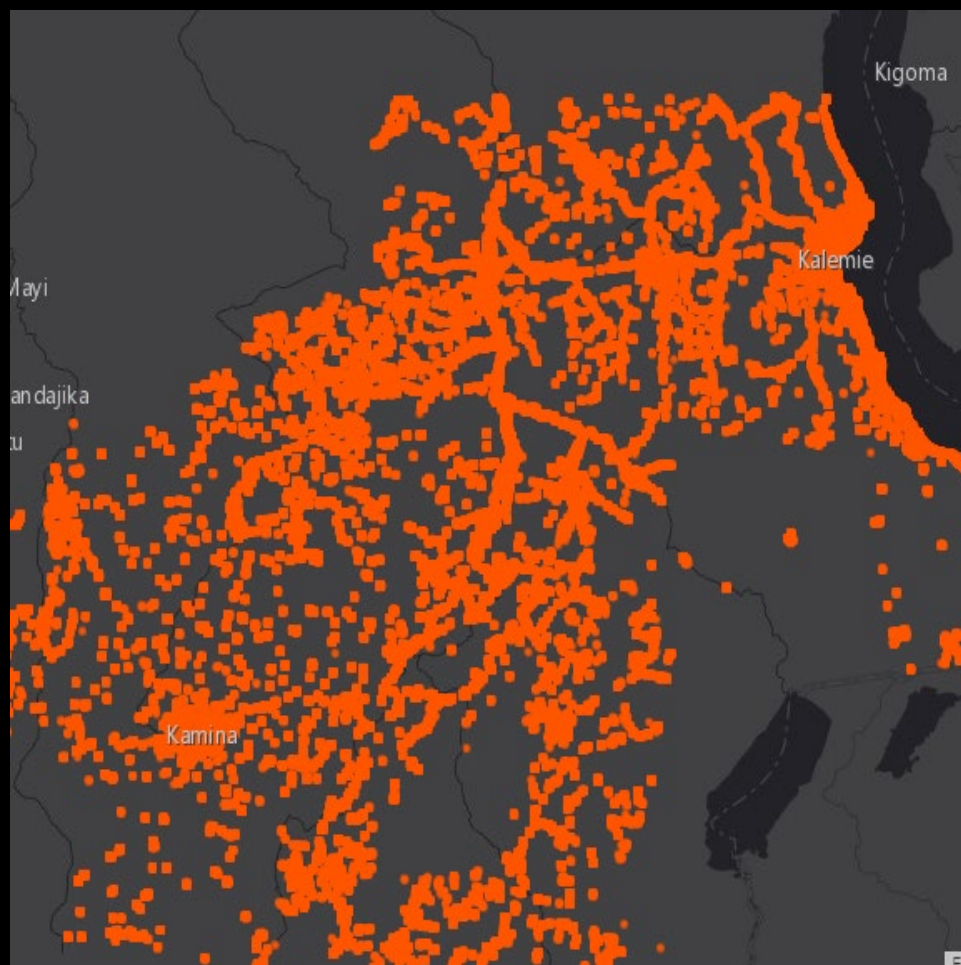


Cross validation



Fixed
post





Total Structures Mapped
(Somalia & DRC)

1,334,992

Last update: 12 hours ago

Structures created
during Mapathon

515,319

Last update: 12 hours ago

Example of microplan map

The map is a hand-drawn microplan of a town area. It features a central grid of streets labeled 'Q. CADASTRE'. To the left is a section labeled 'Q. SOLEIL' and to the right is 'Q. YANGLA'. The bottom area is labeled 'MAKOMENO'. The map includes various buildings, roads, and a river. A black box with the text 'Example of microplan map' is overlaid on the top left corner of the image.

New s
keep c
into t
plans

have
250
was
the
in.

Lovoi

1910 Population

200 Building structure

10 person per
structure



Bukama, Katobwe

5989 Population

265 Building structure

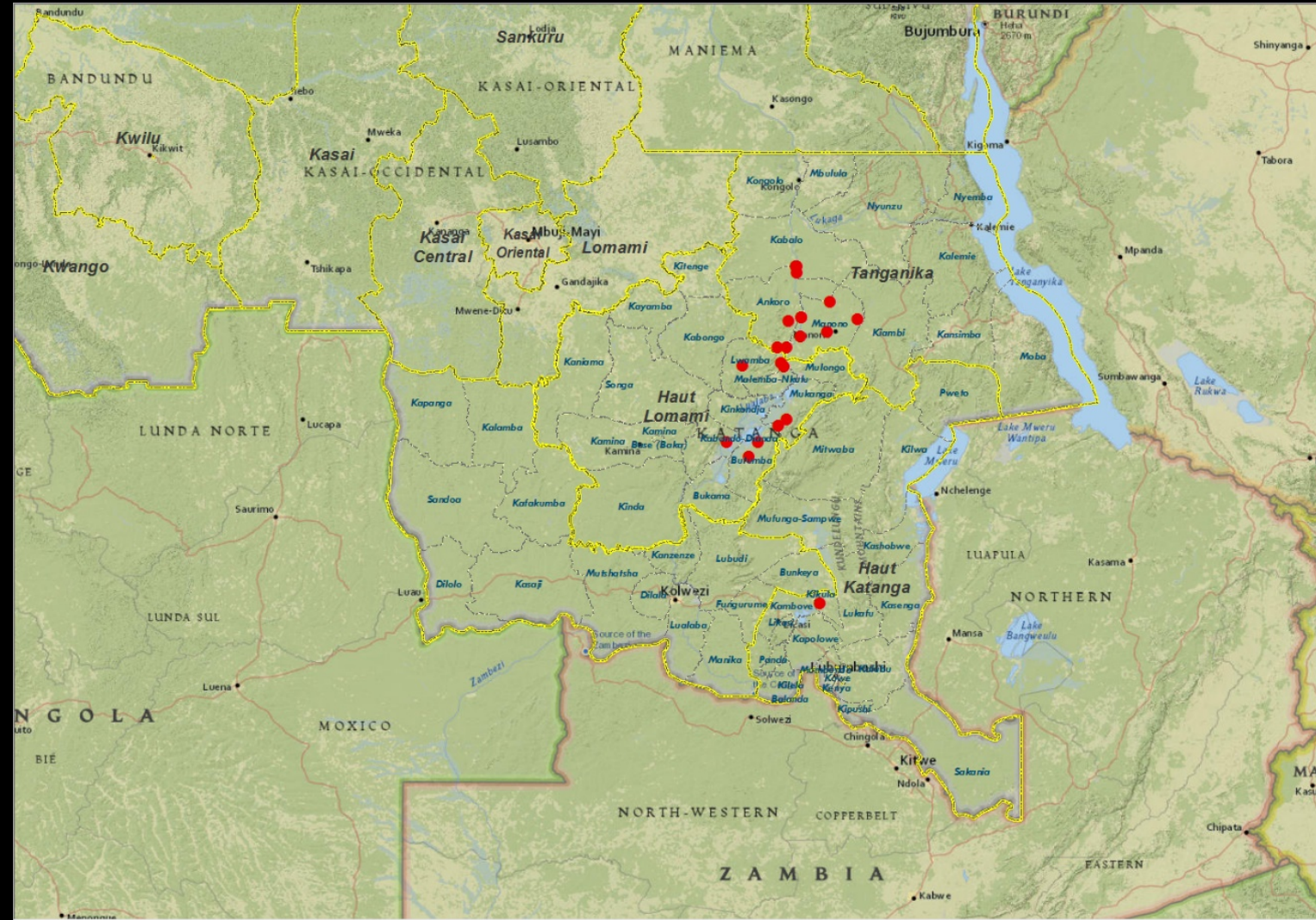
23 person per structure



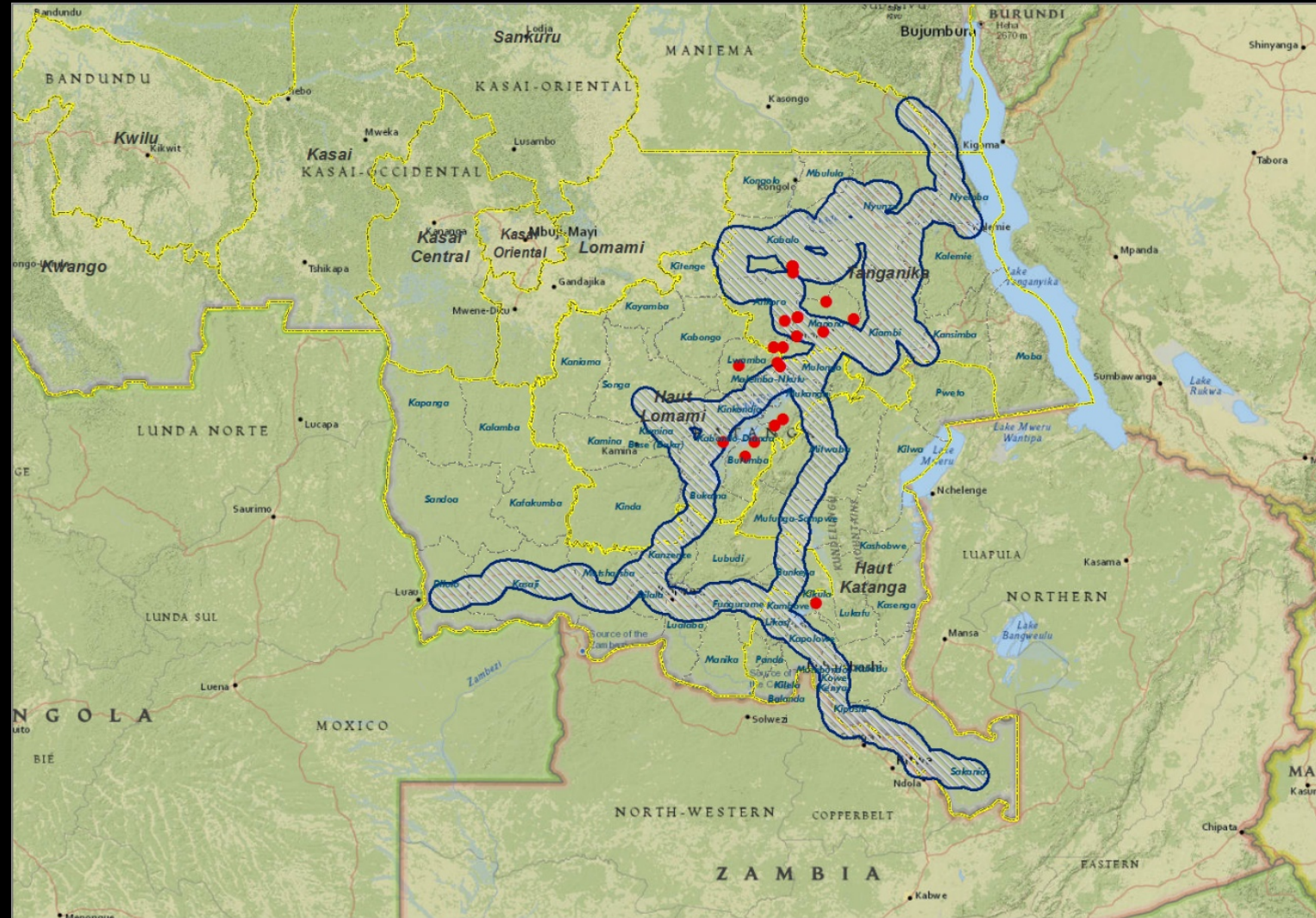


**Supporting
Outbreaks**

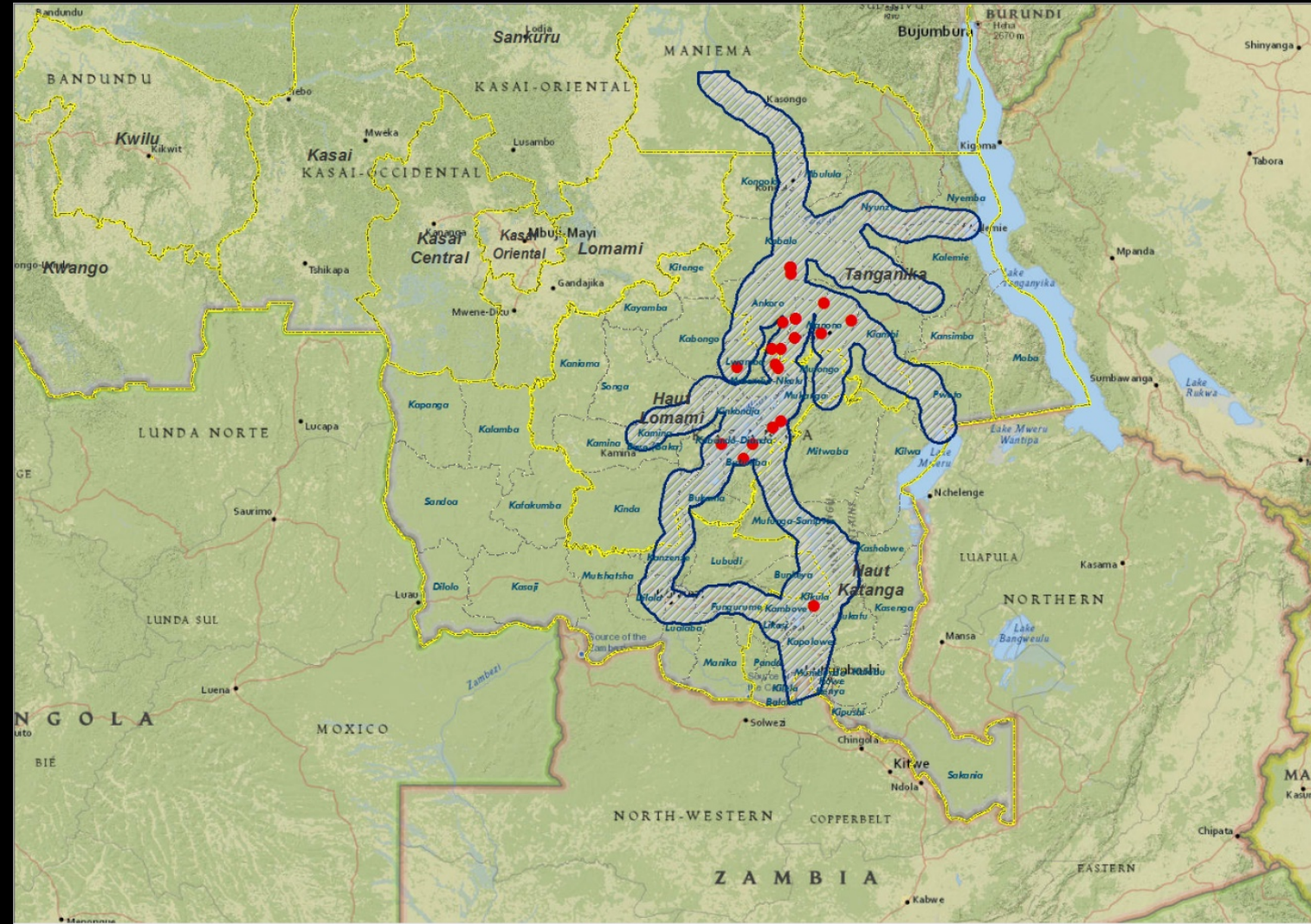
**The cases
reported are
mapped closest
to the location of
the village or
health centre**



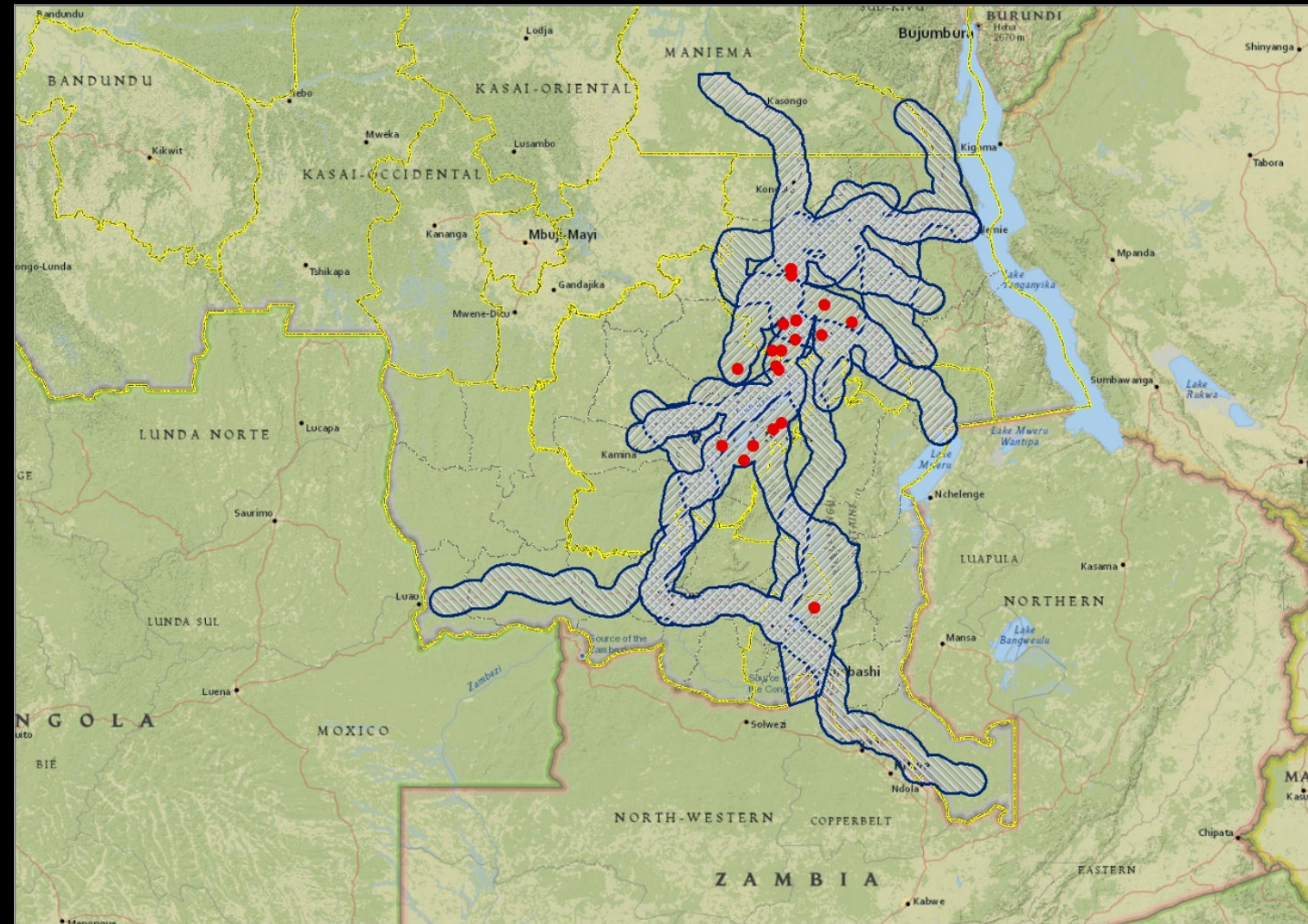
**- Creating a
20kms. Buffer
around the major
roads.**



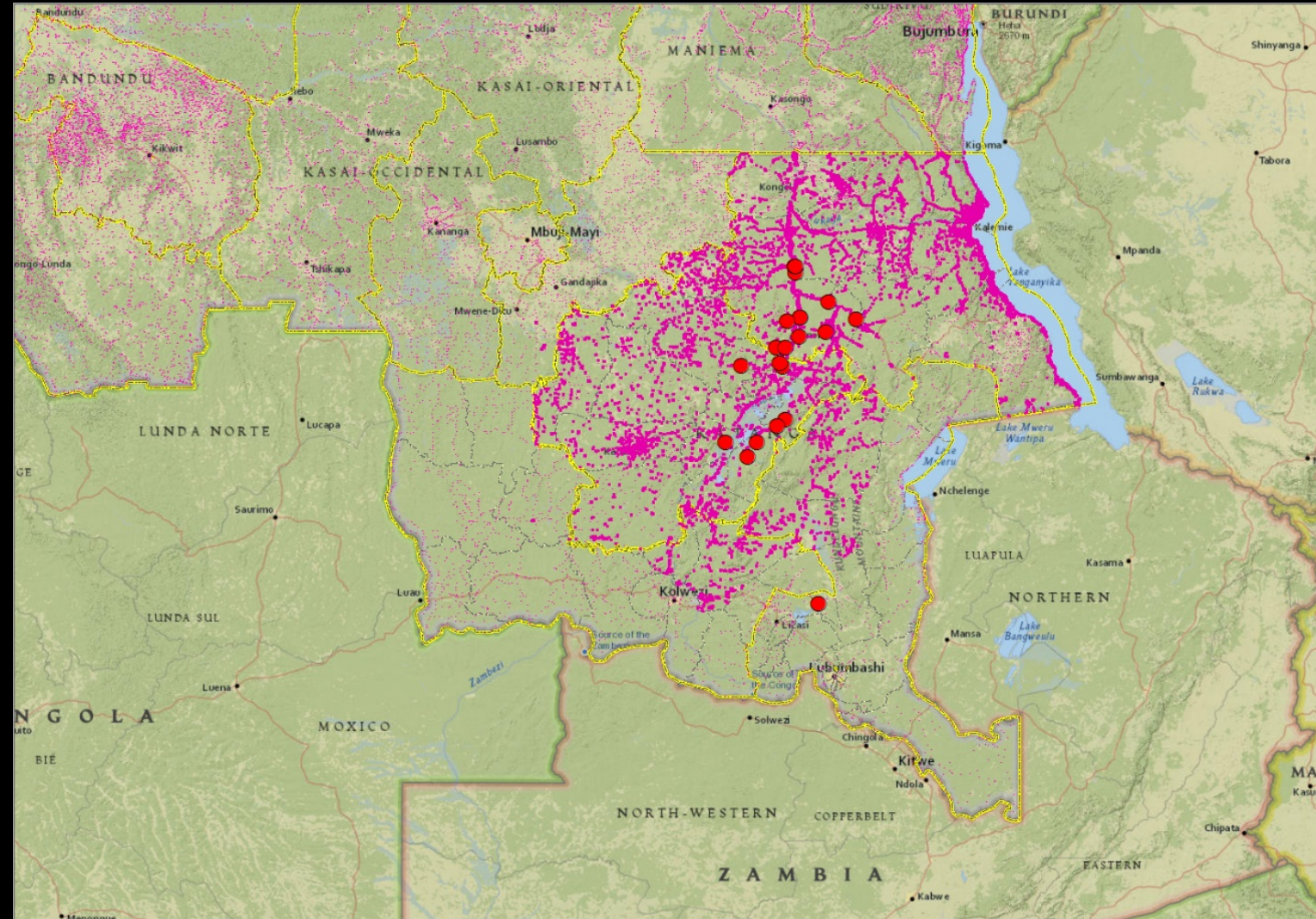
- Creating a
20kms. Buffer
around the
existing river
ways.



**Overlaying the
major roads and
waterway buffer
all the cases got
covered within
the buffer.**



**The layer on
building
structures would
be a key
component to
analyse the risk at
granular level.**



We had an ambition of
mapping
entire Africa,
300 million points
within a
time span of 72 hours
using
300,000 volunteers globally

Mapping of built-up structures for entire Africa using volunteer community

Description

The successful delivery of any health service or emergency response requires knowledge of who needs these services and where they are located. Innovative use of mapping technology as a tool to inform where people live has many potential benefits beyond public outbreak response efforts. Once communities, populations, and geographies have been identified and mapped, information is available to ensure they can be reached with a wide variety of health services that they may have previously missed out on. For example, quality maps can inform routine immunisation ~~efforts~~ the identification of buildings can provide information such as the nearest health facility. WHO has been piloting innovative ~~new~~ mapping technology to improve the quality of information available for these outbreak response efforts. A unique partnership is forming between WHO (World Health Organization), Centre for Disease Control (CDC), ESRI (Private mapping software giant company) and ~~GIS~~ ~~Open~~ (Volunteer agency for GIS professionals) to achieve mapping of around 300 million structures for around 50 countries in Africa over a weekend using around 300,000 volunteers in the month of November 2017.

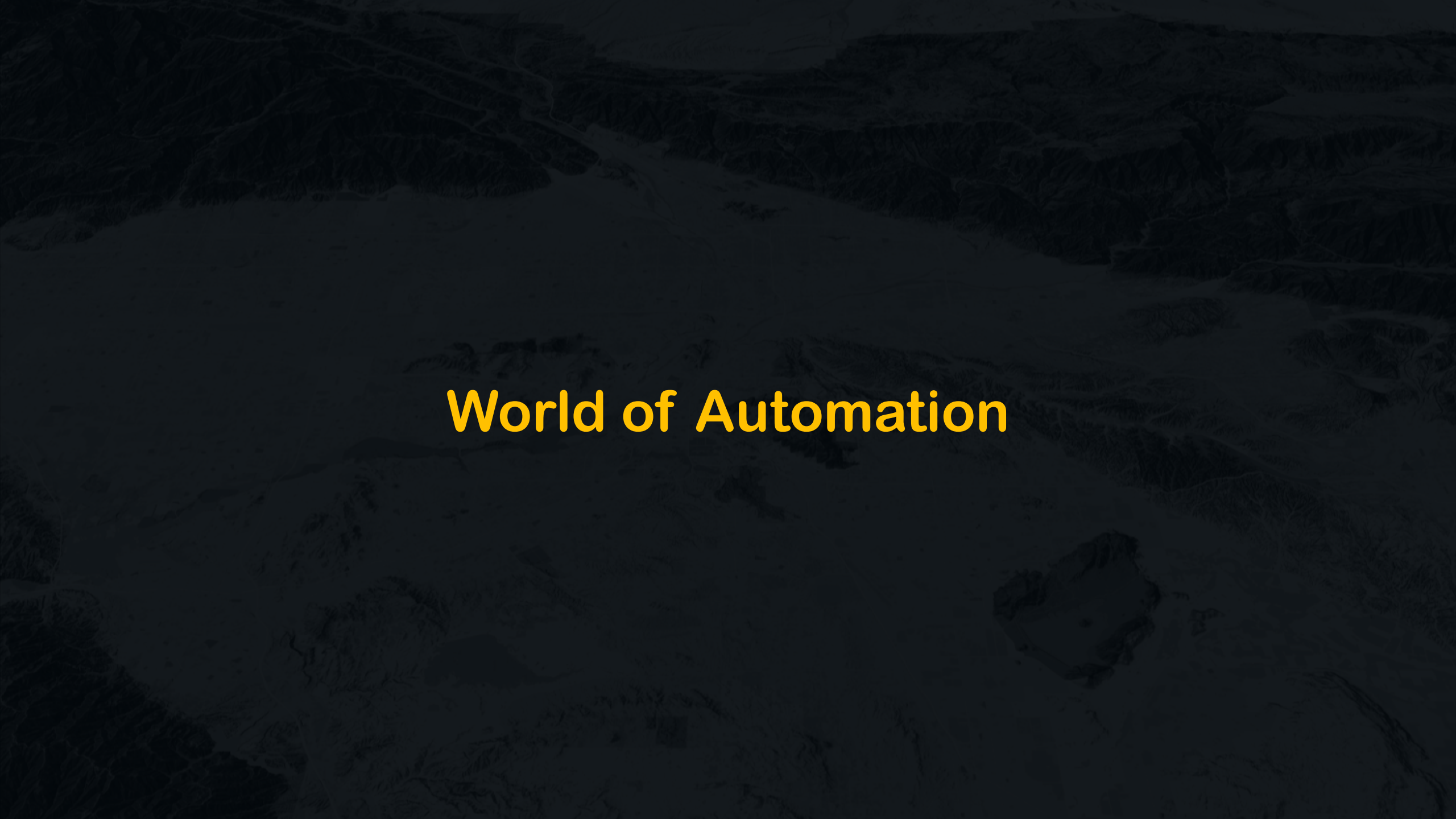
Background / Rationale

1. No reliable spatial information on where people are living for many countries in Africa.
2. Inconsistent spatial population dataset.
3. Supplementary immunisation activities are being actively conducted over 10 countries in Africa with varied vaccination coverage.

Major shifts

The following key points have been identified as major shifts for and outcome of this initiative.

1. Having coverage of the ~~built-up~~ structures for the entire Africa.
2. Using volunteers globally to address the problem could be a quick win to carry out the mapping of the entire Africa.
3. Leverage of new technologies around using High resolution satellite imagery.
4. usage of the baseline data of building structures for further deep learning of extracting building foot prints.
5. can potentially use the address system of what2words to locate buildings instead of latitude or longitude.
6. use of baseline data for ~~health-related~~ service delivery.
7. Will help the spatial distribution of population models at granular scale.



World of Automation

World of Automation



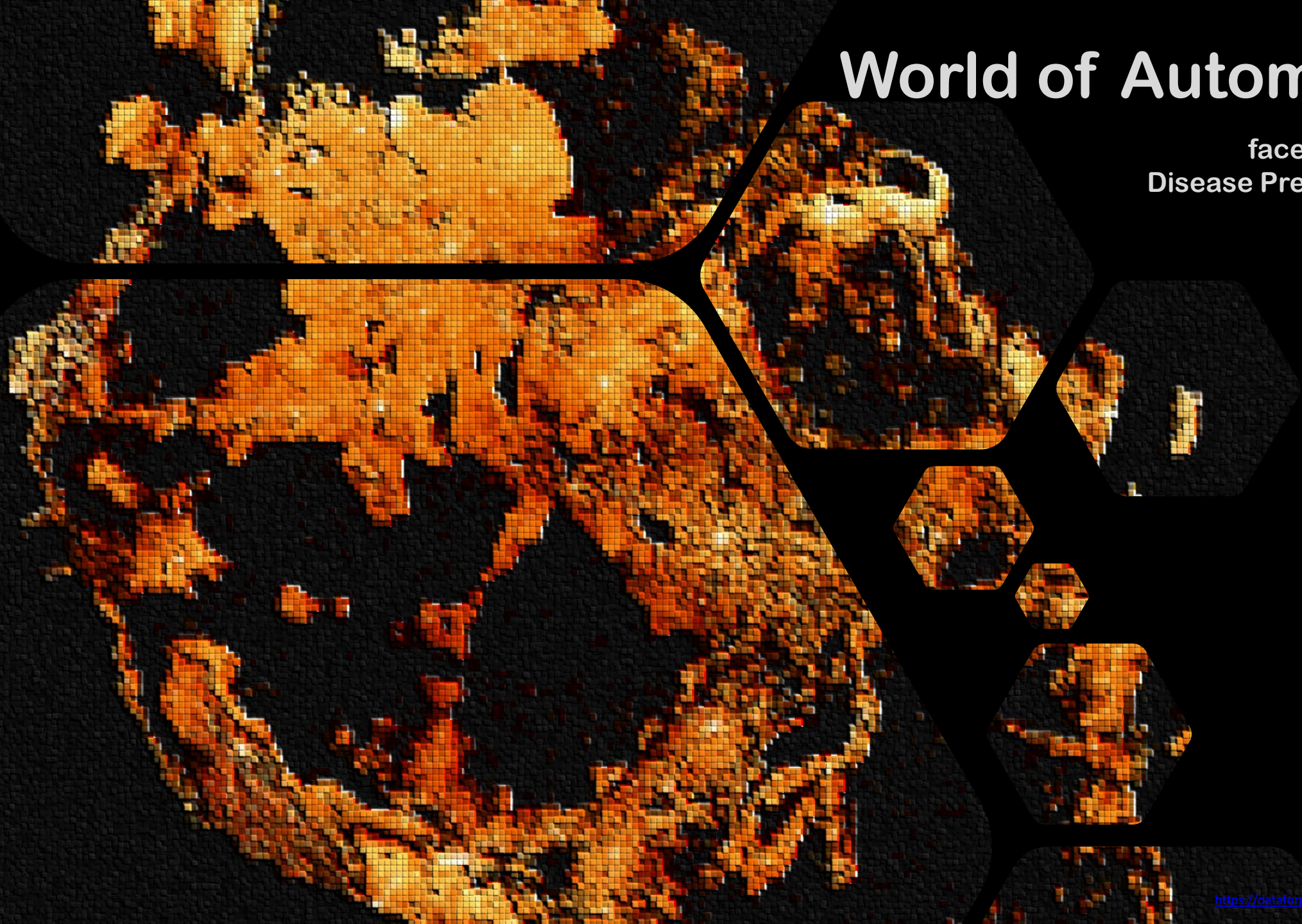
Mapping every building in Sub-Saharan Africa

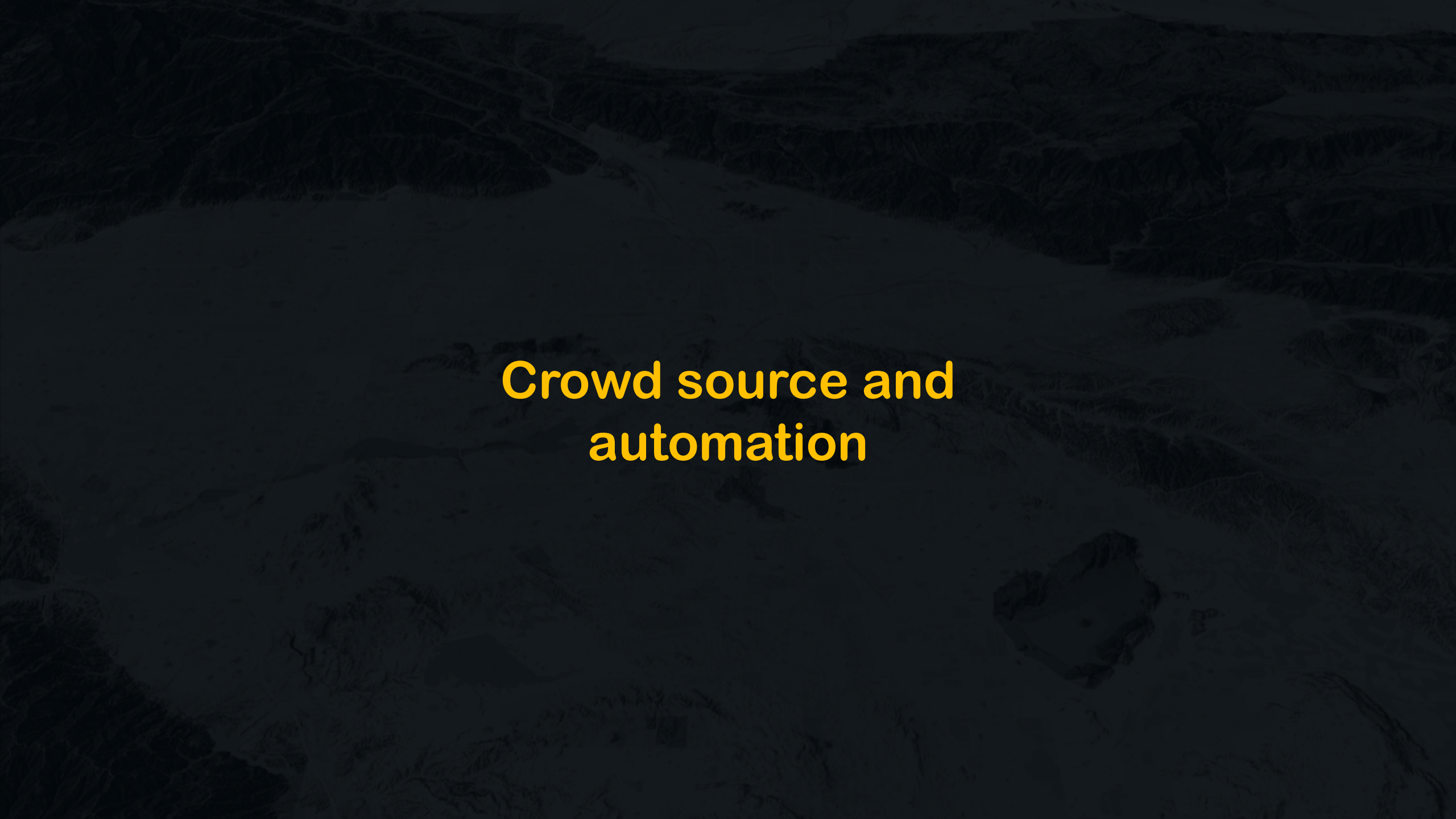
powered by satellite imagery and artificial intelligence

by Digital Globe

World of Automation

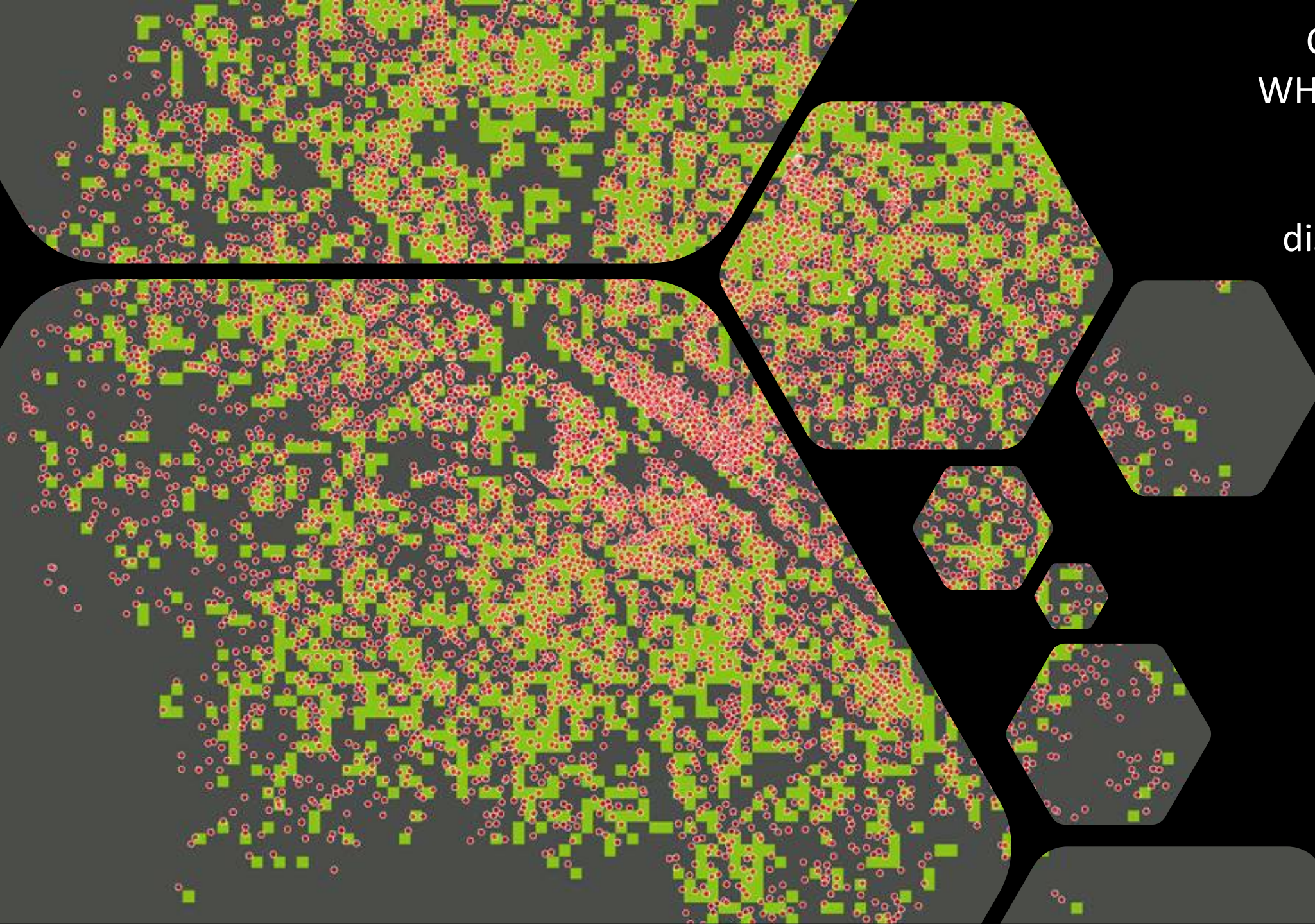
facebook
Disease Prevention Maps





Crowd source and automation

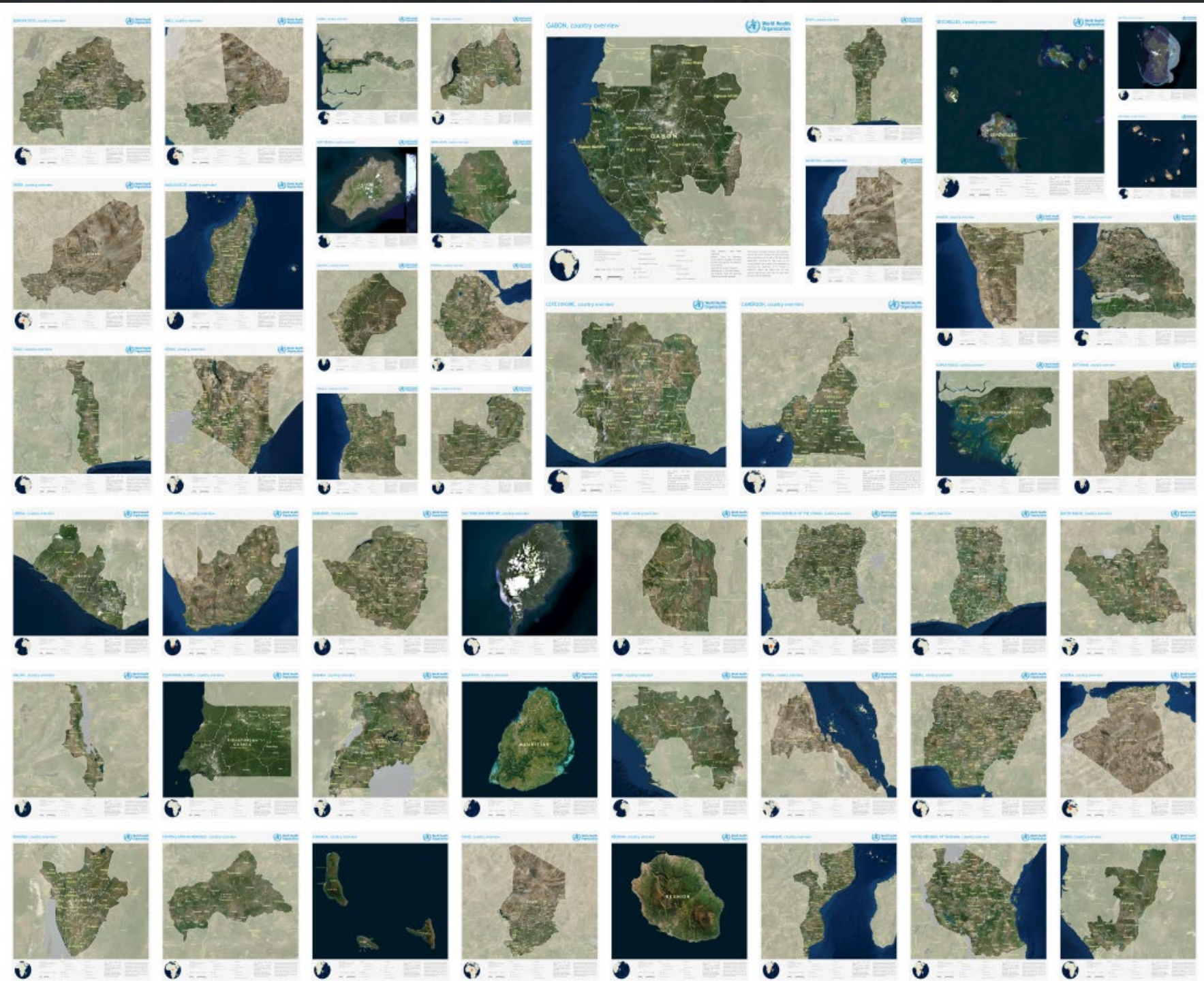
Comparing
WHO mapathon
with
facebook
disaster maps



Crowd sourcing and Automation

1. combination of both crowd sourcing and automation could be a good idea.
2. Creating training samples can be crowd sourced.
3. Automation could be used to do the feature extraction.
4. Validation of outcomes of the building foot prints can be crowd sourced.

thank you



The background features a dark blue color palette. The top half has a subtle topographic map pattern with fine, light-colored contour lines. The bottom half is divided into two sections: the left side has a darker blue area with faint, larger-scale wavy patterns, and the right side is a solid, medium-dark blue. A diagonal line separates these two bottom sections.

Questions?