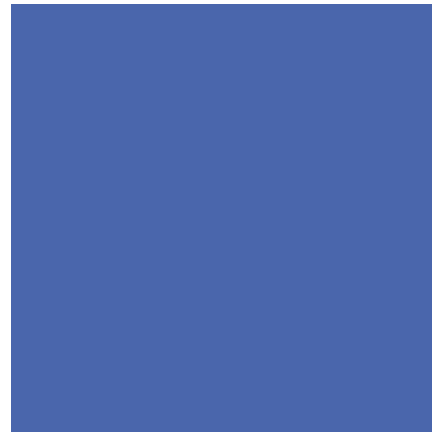
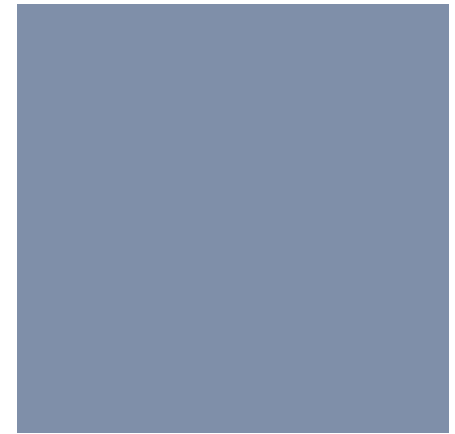




**Village** Data Analytics



AN INITIATIVE BY



**T F E** E n e r g y

## Scaling Mini-Grids with Machine Learning

March 2019

Over 2 billion people live with unreliable electricity.

**MORE THAN 300,000 MINI-GRIDS AND AN ESTIMATED \$14 BILLION IS REQUIRED TO ACHIEVE SDG7.**

## PROBLEM

*Identifying remote villages for mini-grid installation and gathering useful information about them is a key barrier. Surveys are **slow, costly and imprecise**.*

*This leads to long project development timelines, low operational margins and restricts access to finance.*



## NEED

### SCALING MINI-GRIDS MEANS FINDING COMMERCIALY VIALE MINI-GRID SITES

We need a reliable, fast and scalable method to identify commercially viable sites for mini-grid development and to make the information available to development organizations, government, donors and energy companies.



## SOLUTION: VILLAGE DATA ANALYTICS (VIDA)

A software-enabled service that automatically identifies remote villages and determines its suitability for a mini-grid installation.

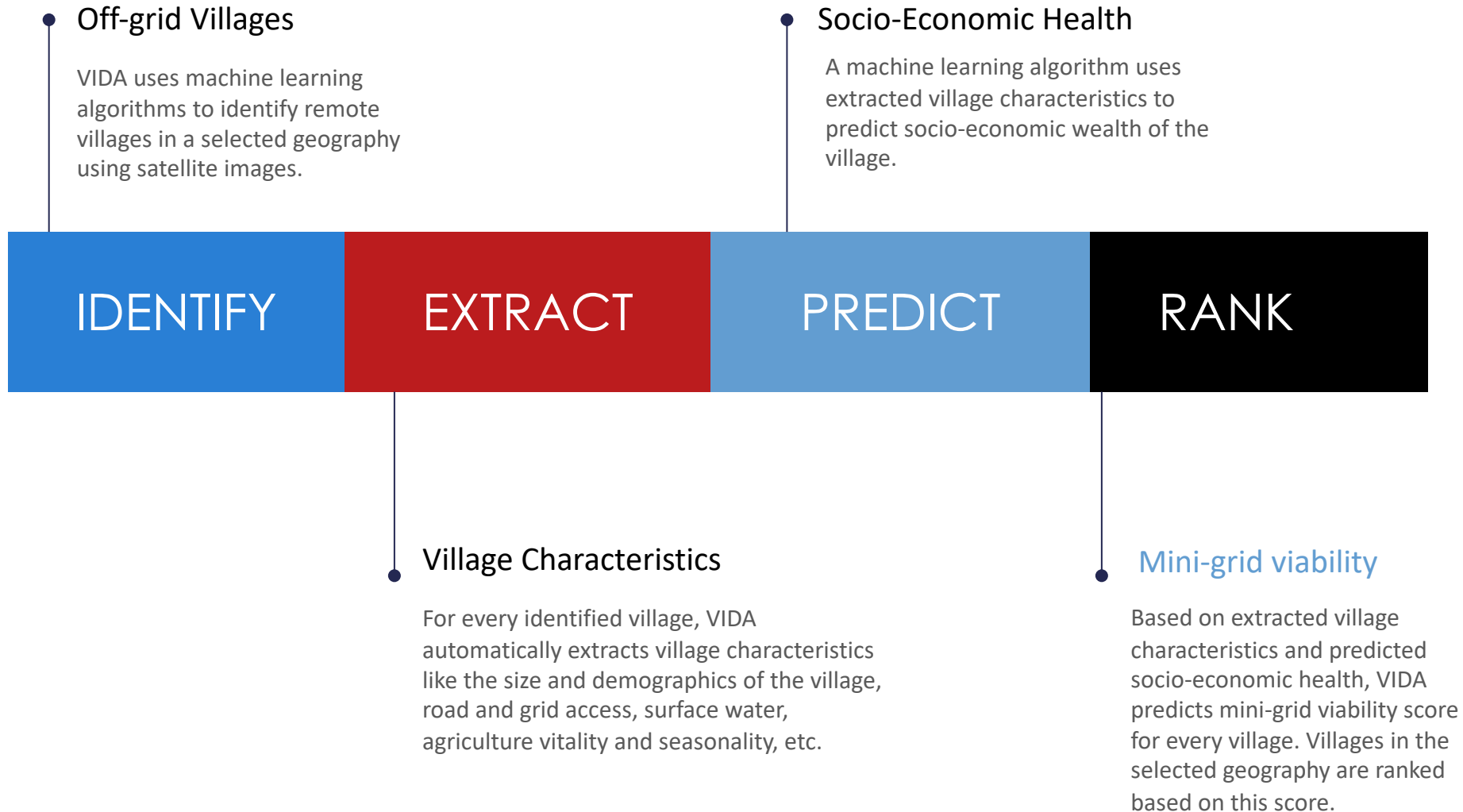
VIDA uses machine-learning algorithms to allow data driven decision making. This de-risk projects and reduce time, costs for commercially viable mini-grid planning and investment at scale.



Supported by European Space Agency

VIDA Interactive UI

# WORKFLOW: MACHINE LEARNING ALGORITHMS IN VIDA





## CASE STUDY: SOKOTO

Identification of viable mini-grid sites in a 100 square kilometer area in Sokoto state of Nigeria.



## AREA OF INTEREST (AOI)

VIDA customers select an area of interest to determine viable sites for mini-grid installation. In this case, an area of 100 km \*100 km in Sokoto state of Nigeria is selected.



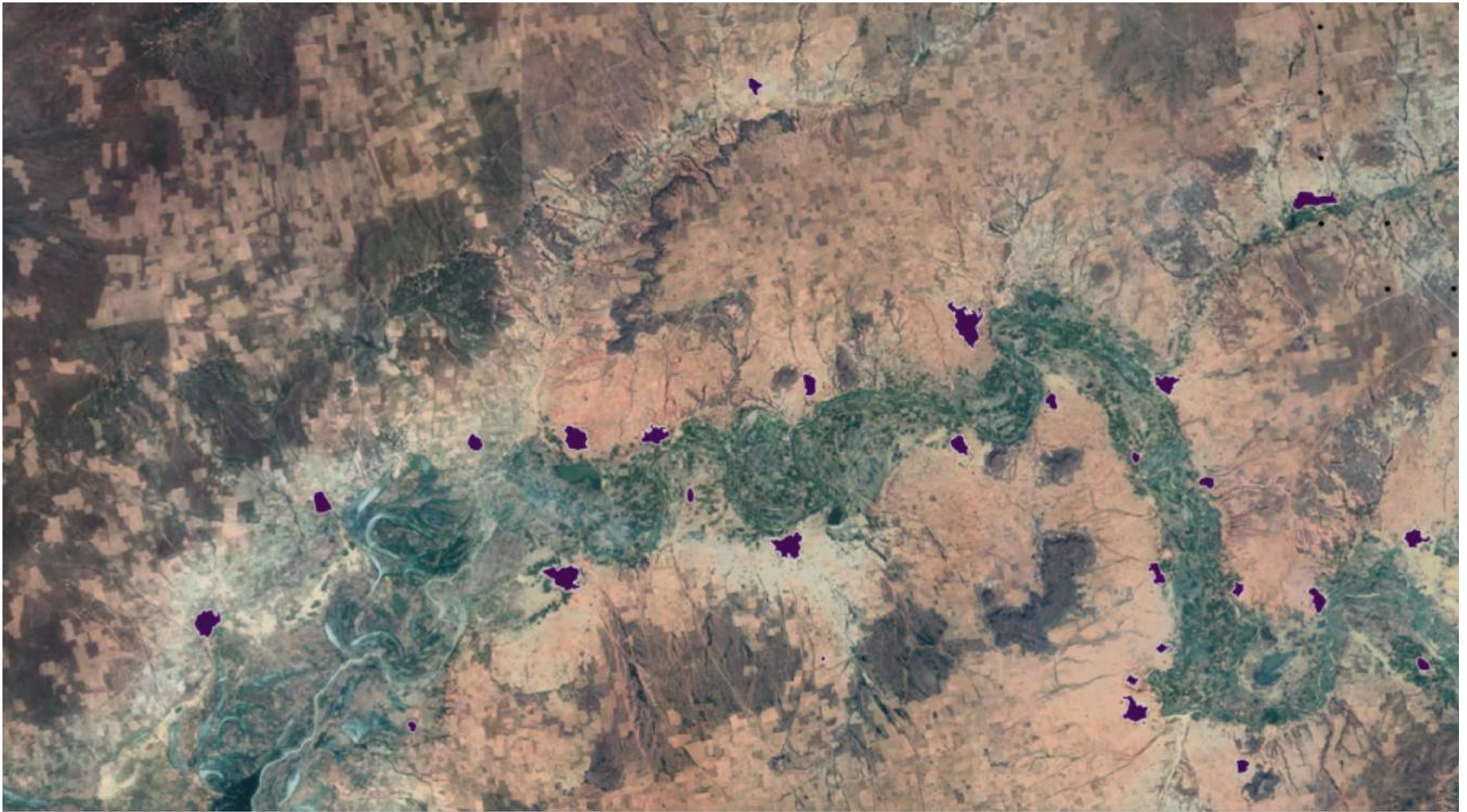


## + IDENTIFICATION OF SETTLEMENTS

VIDA uses a proprietary machine learning algorithm to automatically identify villages in the AOI using satellite images. Area marked in purple color shows villages or large settlements detected by VIDA.

Actual VIDA Screen Grabs

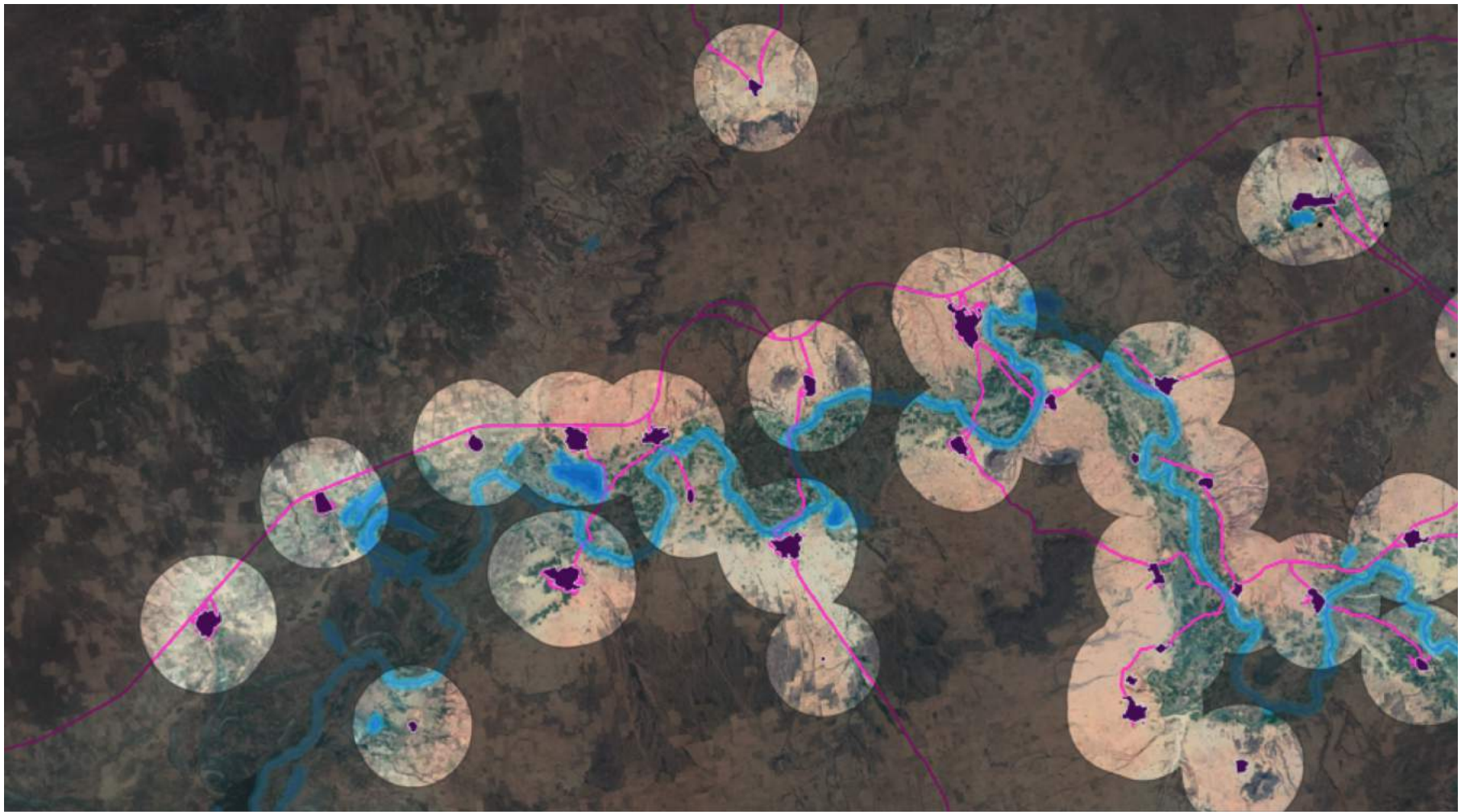




## + ZOOMED IN VIEW OF A SECTION OF THE AOI

From every village detected by VIDA, a second algorithm extracts information that characterizes the village. VIDA extracts information from a 2km<sup>2</sup> area around the village (catchment area).



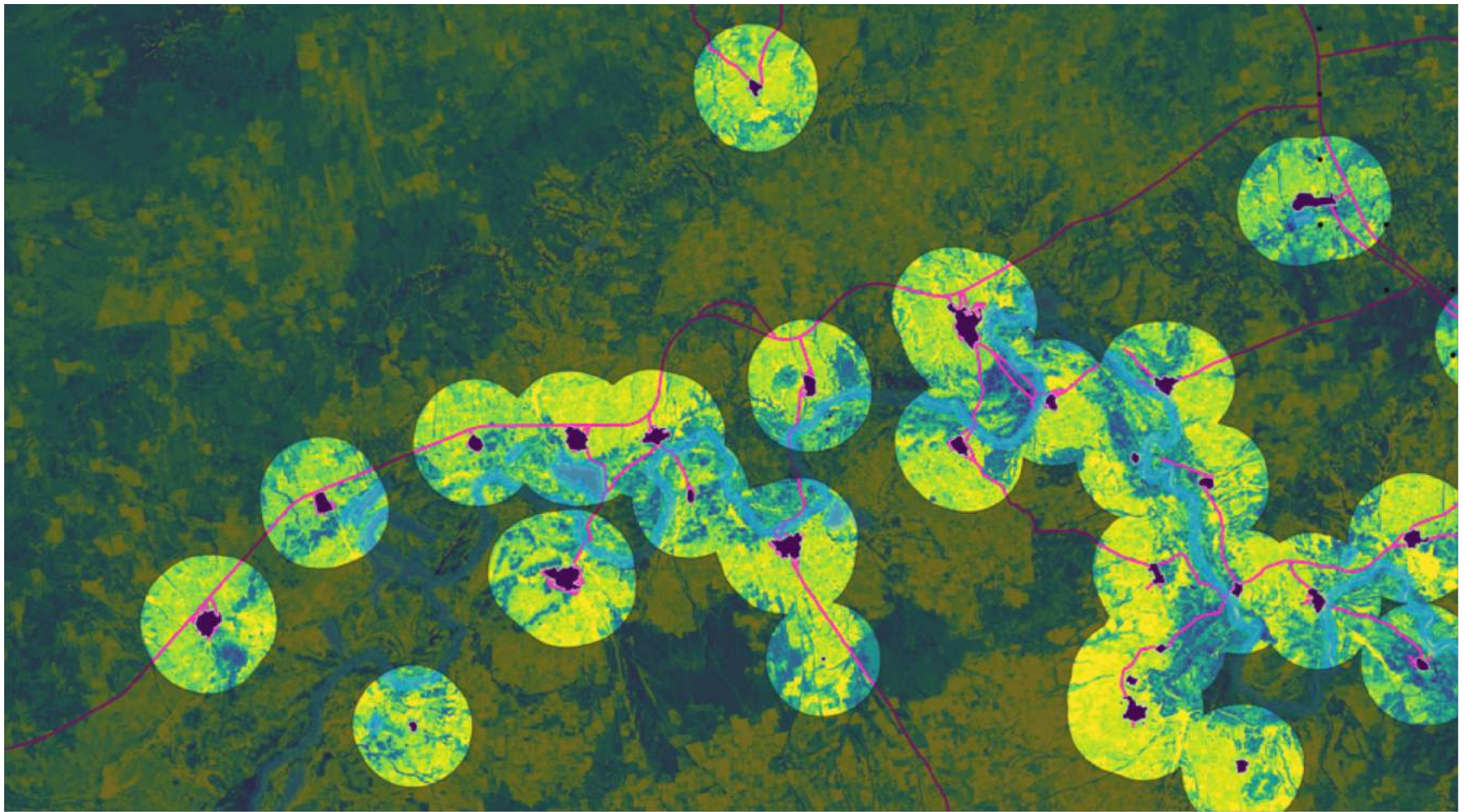


## + EXTRACTION OF INFORMATION

Information on 4 major village characteristics is extracted from villages. They are: village demographics and size, access to road and grid, access to water body and, agricultural analysis. In total, more than 15 quantifiable indicators are extracted from every village.

Actual VIDA Screen Grabs



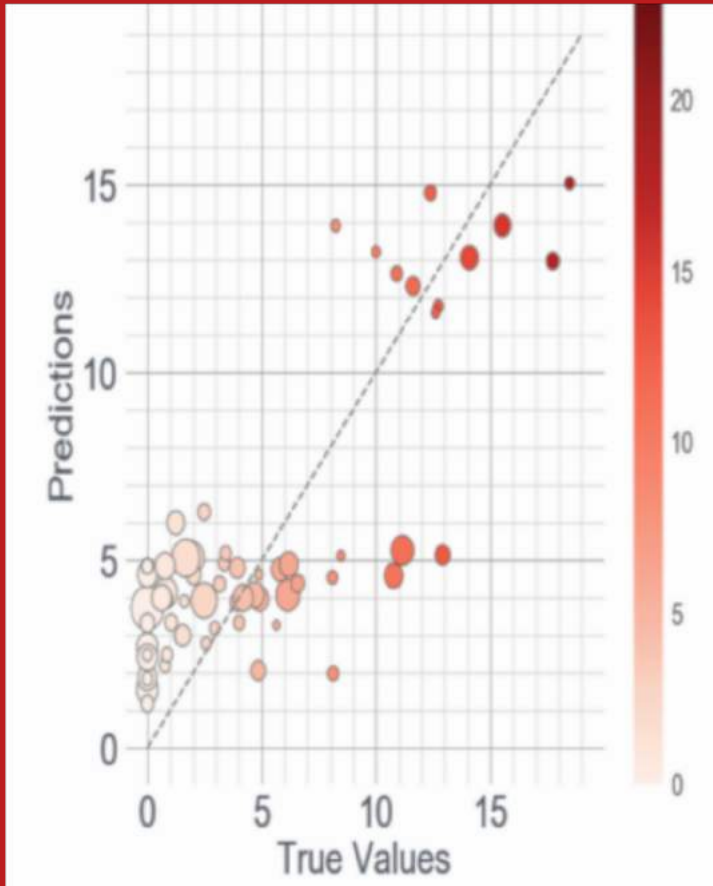


## + EXTRACTION OF INFORMATION

Image of the same section of the AOI with agriculture analysis.



Asset ownership prediction by ML algorithm

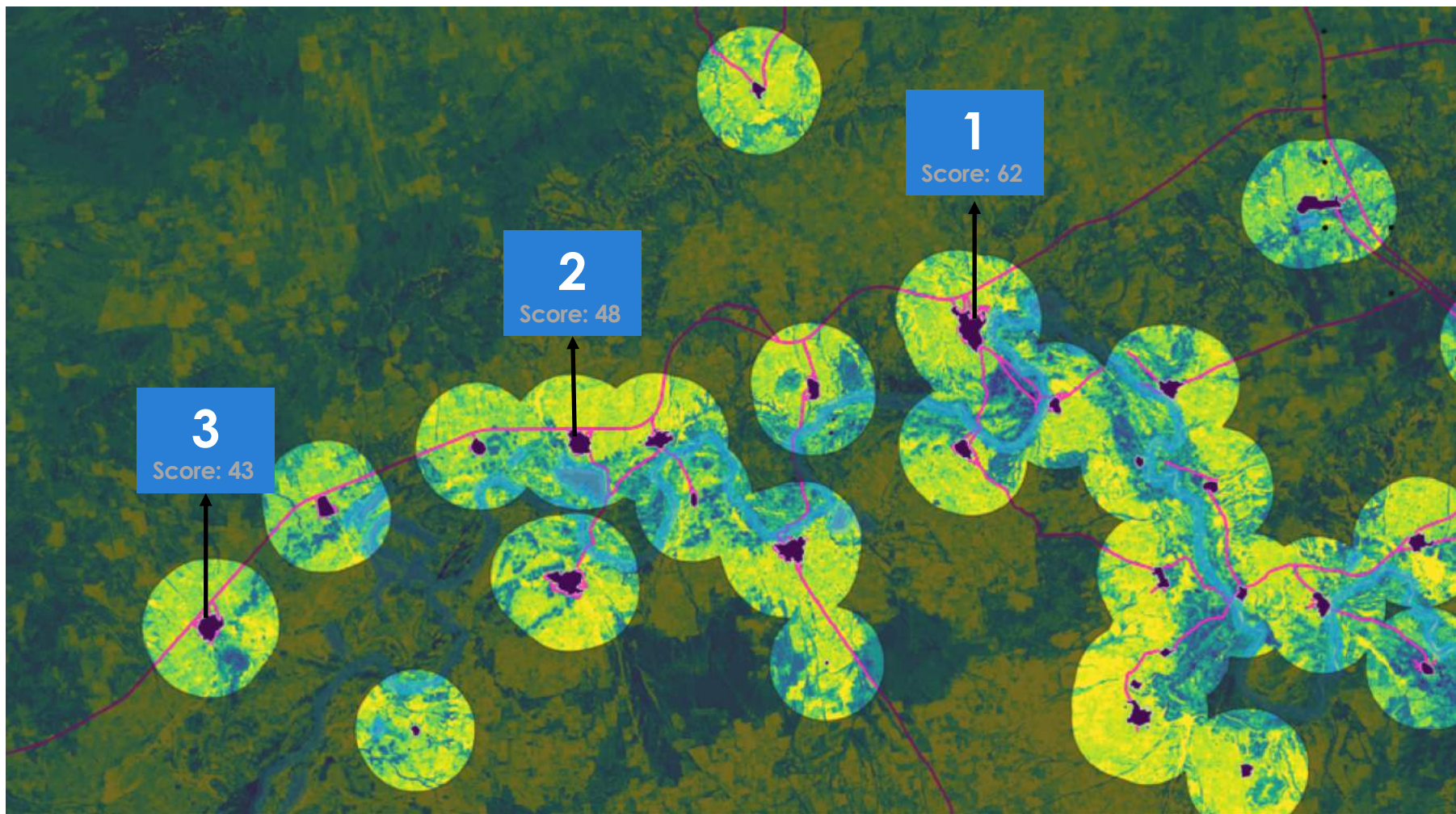


## Prediction of Socio-Economic Health

Predicting socio-economic health of a village based on extracted village characteristics is possible using machine learning algorithms.

Public and partner ground truth data is used to train the machine learning (neural network) algorithm.

With existing datasets, we have seen strong correlation between extracted village characteristics and its socio-economic health.



## + RANKING

Based on the predicted socio-economic health of village and extracted village characteristics, VIDA predicts mini-grid viability score. Villages in the AOI are ranked based on this score.

Actual VIDA Screen Grabs  
\*Score and ranking is representative



## THE TEAM

INCUBATED BY ENERGY EXPERT – TFE ENERGY



### **VIDA is a TFE Energy initiative.**

The team brings together high impact technology and deep energy access market expertise in Africa and Asia. The team knows the most relevant information layers to extract energy access insights. VIDA has 6 full time employees, and is lead by Tobias Engelmeier.

### **Supported by:**



### **Technology Partners:**

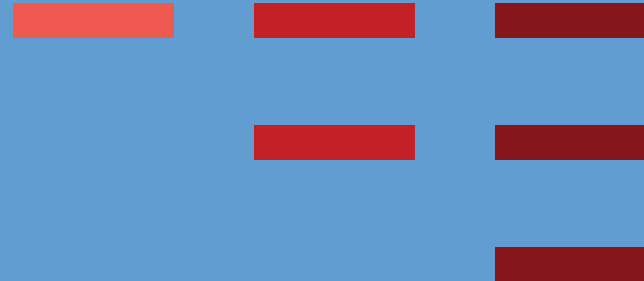


**IABG GmbH** is an expert at analysing satellite and aerial imagery to map urban and rural communities.



**appliedAI** is Europe's largest non-profit for the application of artificial intelligence and the only official partner of Google in Germany.





**Village** Data Analytics

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