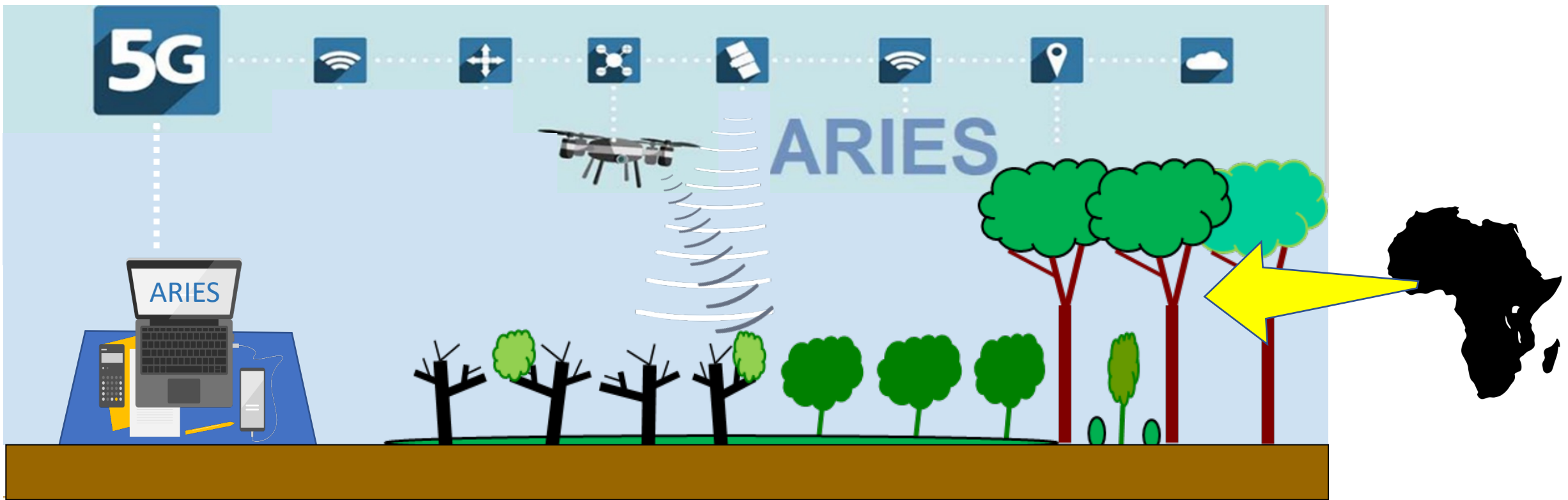


Development of Aerial Risk Inspection, Evaluation and Surveying (AIRES) Platform for Cocoa Plantations in Ghana

Jon West

Protecting Crops and the Environment Group
Rothamsted Research





DEVELOPMENT OF AERIAL RISK INSPECTION, EVALUATION AND SURVEYING (ARIES) PLATFORM FOR COCOA PLANTATIONS IN GHANA

Our team



ROTHAMSTED
RESEARCH



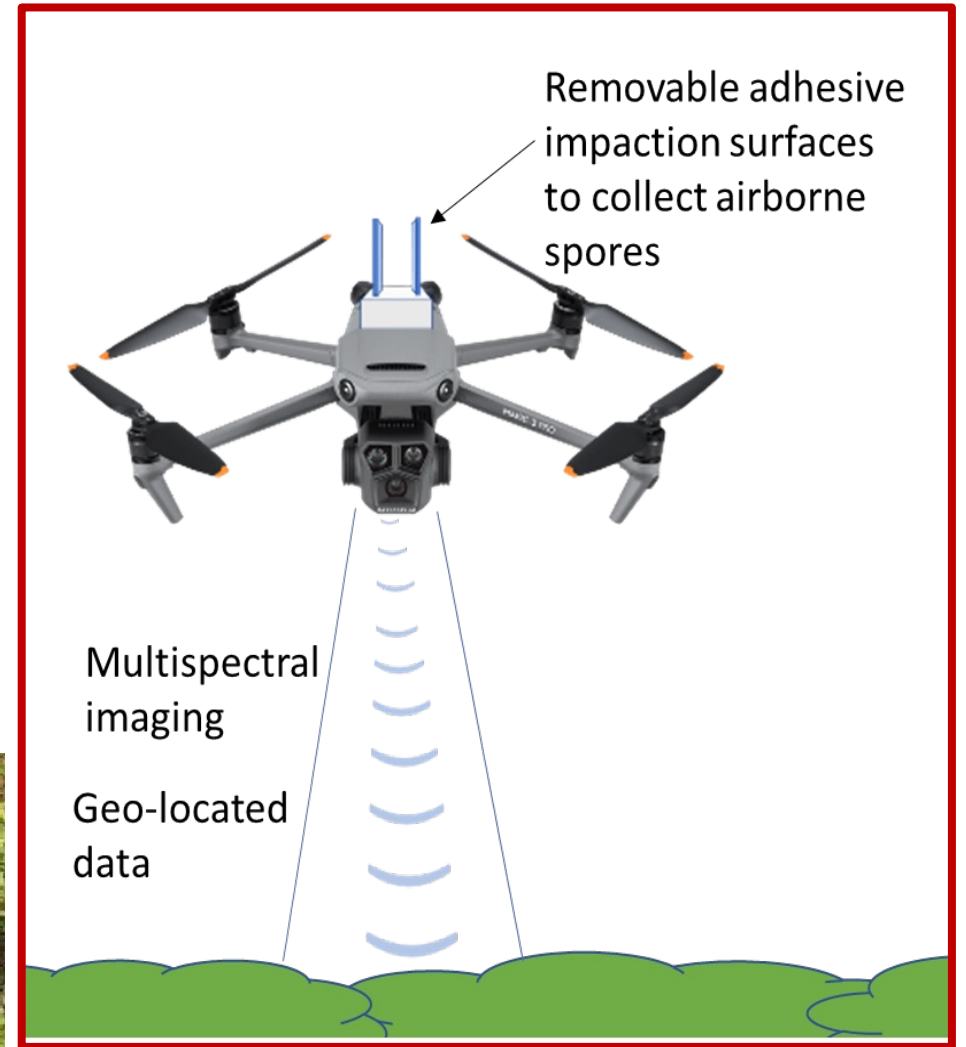
**Agritech Catalyst Round 8, funded by DFID
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Purpose

- Development of satellite and data analytics and drone based multi-sensor data analytics to estimate Cocoa health and risk levels in cocoa plantations
- Development of an artificial intelligence neural network mapping to relate the drone-based imaging acquisition measurements with cocoa health risk.
- Development of a prototype desktop software system that shows CSSV risk zones and provides user tools for data review and reporting as a part of their subscription service.
- Development of a prototype desktop based data application that allows users to review presence of CSSV on GIS maps and receive updates on risk zones related to their area.

Cocoa Swollen Shoot Virus causes defoliation



Key results of this project

1. The project developed an **integrated approach** to detecting areas of cocoa vegetation that are diseased or have been cut down because of disease using drone based imaging and spore collection.
2. The project developed **new spore collection hardware**, and proved that it is very beneficial at a low cost, delivering disease information on localised regions not available otherwise. It can analyse for a large number of diseases.
3. The project developed a **cloud backend** to deliver results to end-customers which can easily take many more inspection runs than those collected during the project.

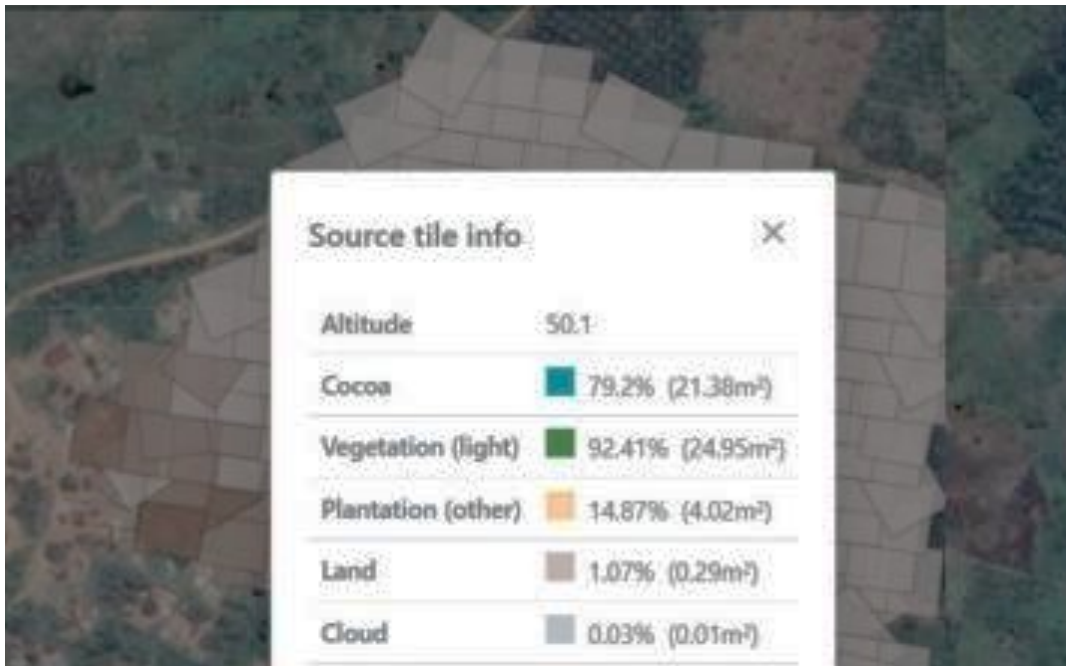
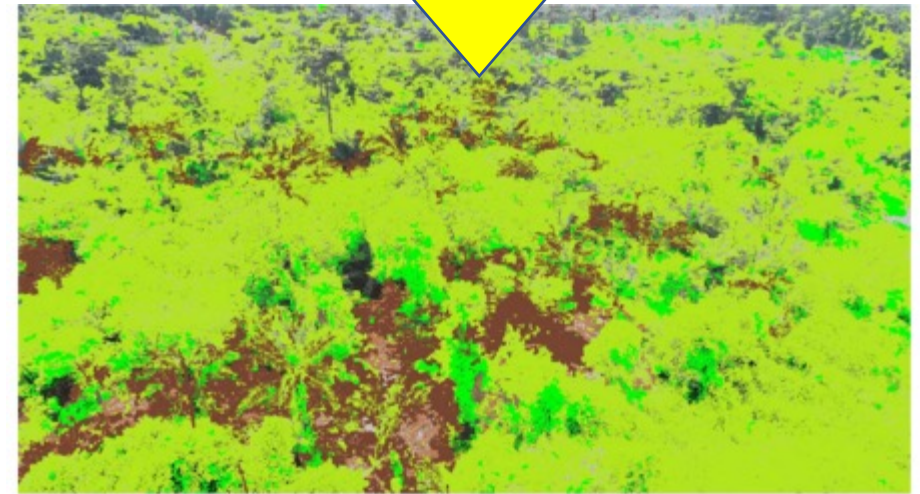
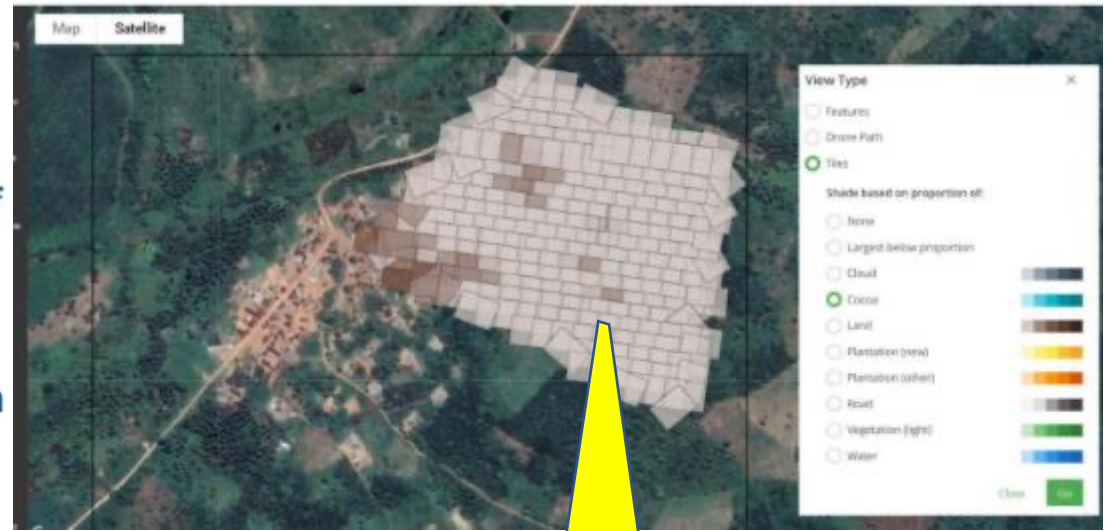


Image Analytics

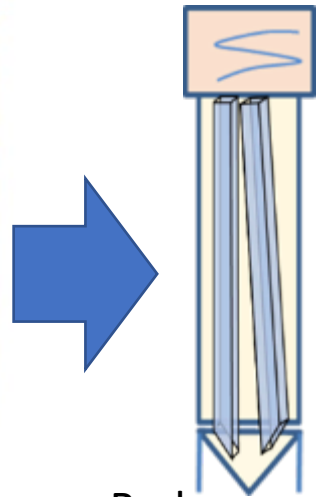


Workpackage 4: A Multi-functional Drone to sample airborne spores and image plant canopies

A method was developed to detect *Lasiodiplodia* spores (fungal disease of citrus and other fruit)



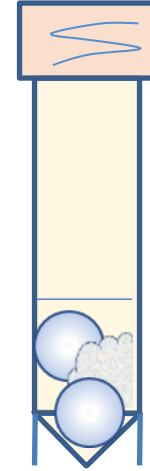
Drone captures spores onto Vaseline-coated rods while taking photos of the tree canopy



Rods transferred to a 2ml tube



Vaseline containing spores swabbed with small piece of cotton wool



Shake

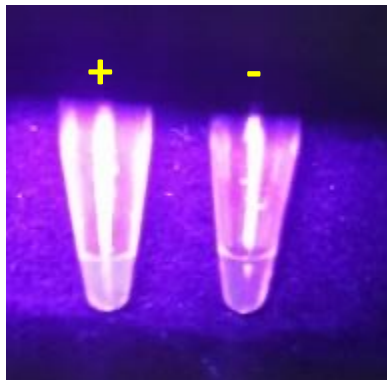
Tube with cotton wool swab, two ball bearings and 200uL extraction liquid shaken by hand for 3 minutes to disrupt spores



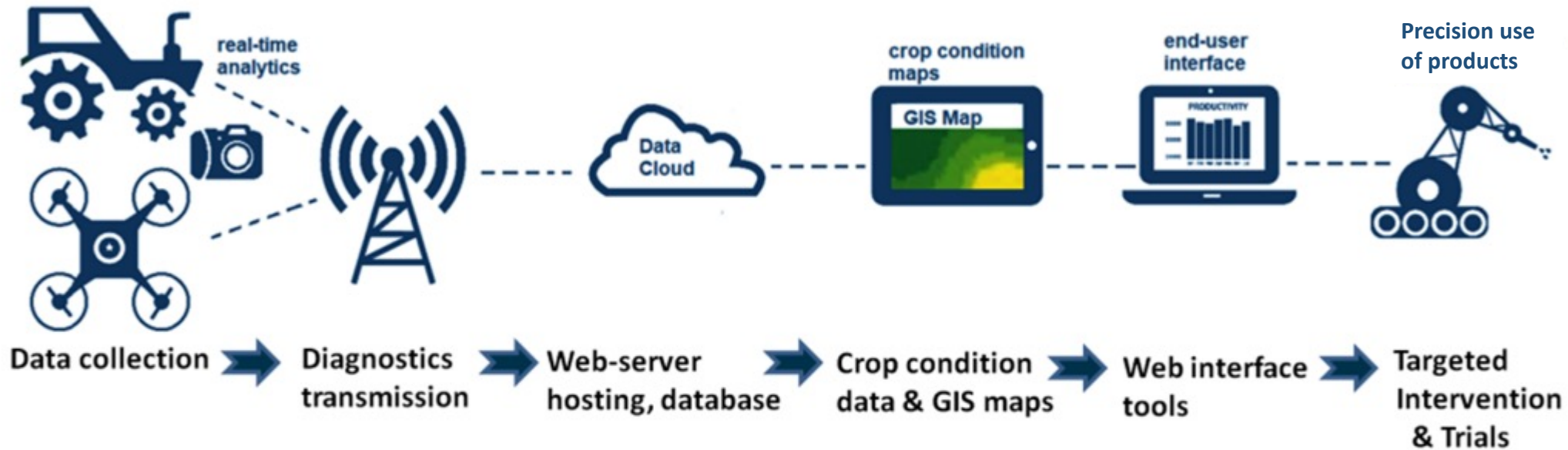
Place 2 drops of disrupted spore suspension into vial of dry reagent



Place vial in heater block and heat at 65C for 1h20mins



View result under UV torch-light in viewing box. Yellow = positive (spores present), pink = negative



FUTURE OPPORTUNITY

1. The above architecture is of **generic** value and can be applied to a range of produce in addition to Cocoa
2. To implement another crop, we need to make **changes** primarily to altitude of data collection with drones and algorithm for analysis
3. Commercially a **Service** based provision of data to end-customers is possible through the web-platform