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Towards the Sustainable Development Goals

Improving the earth observation ecosystem in the United Kingdom

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Sustainable Development Goals in the UK

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UK First Voluntary National Report

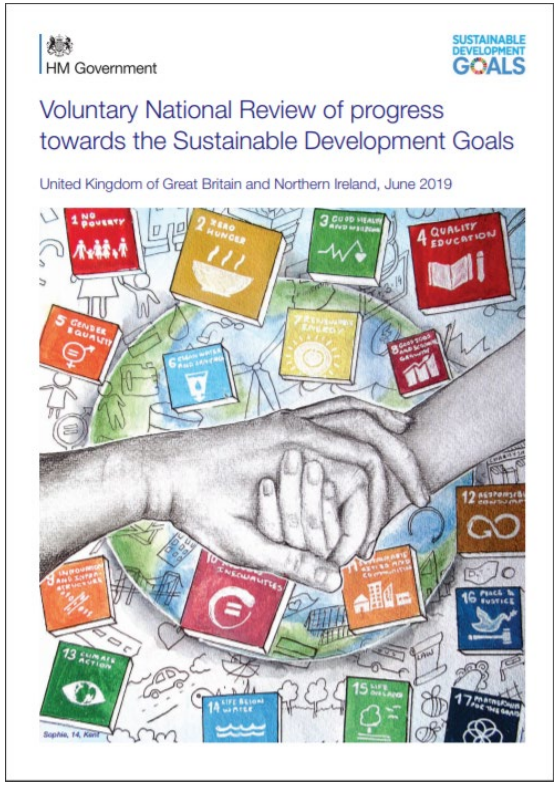
74% of indicators have data (180 of the total 244) as of June 2019

Significant progress made against:

- high-quality health service;
- high and rising standards of education;
- increasing employment – women and disabilities;
- climate and the environment.

Disaggregation highlighted as a major gap in the data

UK remains committed to 0.7% GNI on development to support delivery of the Goals



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Earth Observation in the UK

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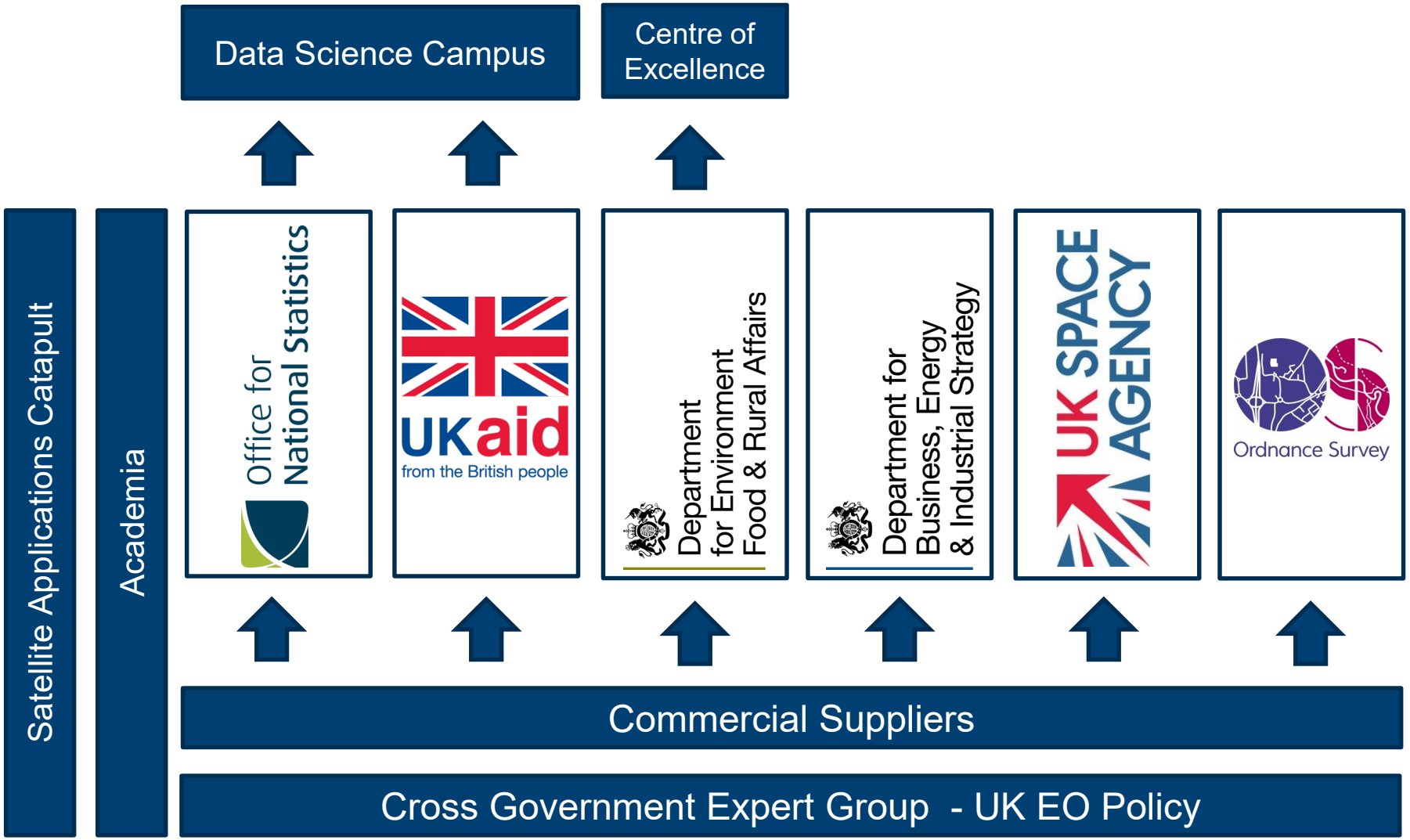

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Classifying urban vegetation

Joint project between OS and Ordnance Survey

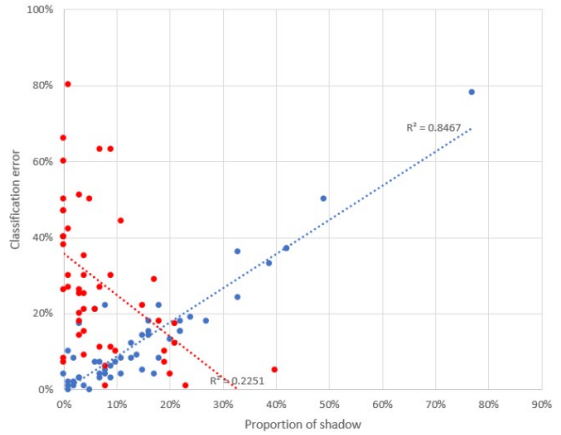
Aiming to identifying the proportion of vegetation for urban residential gardens in Great Britain.

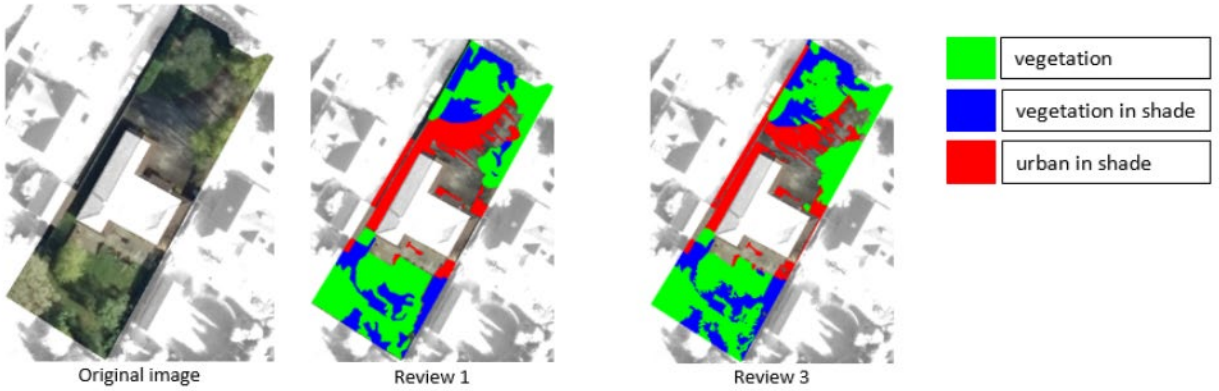
Used remote sensing and machine learning techniques with high-quality aerial and satellite imagery

Developed a tool able to classify the contents of an image with accuracy – a neural network classifier

estimate that 62% of garden space is vegetation.

In urban areas this drops to between 45% and 54%





Future-proofing of arabica coffee production in Ethiopia

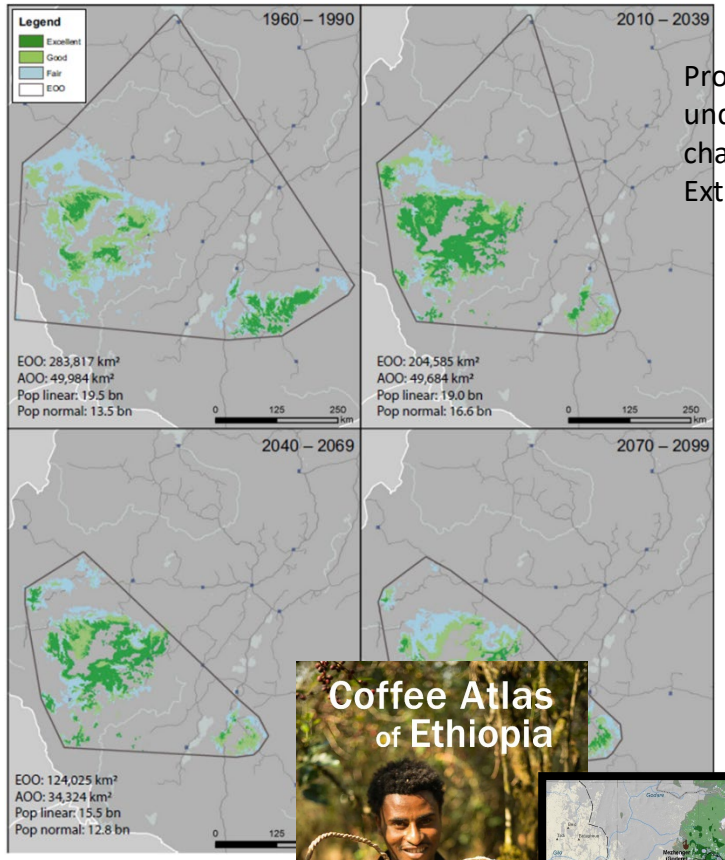
Arabica coffee is a critically important crop for Ethiopia and worldwide. Coffee as a whole it the second most traded commodity after oil.

Kew's research has been fundamental in understanding climate change threats and opportunities for this species, and particularly in Ethiopia.

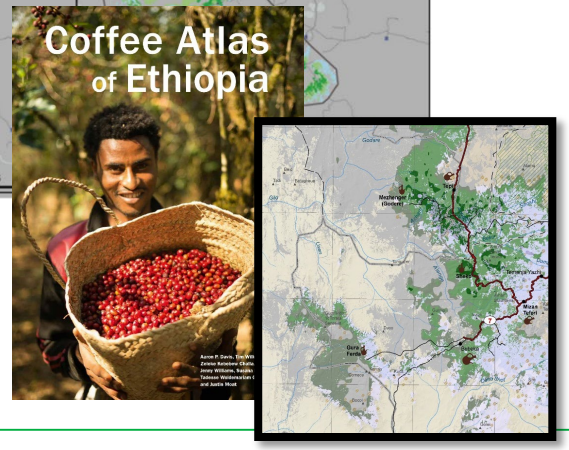
The outputs from the research include: (1) rigorous assessment of risks and opportunities for wild and farmed Arabica in Ethiopia; (2) documents and resources for decision makers; (3) resources and analyses for intervention planning and action.

Impacts:

- NGOs in Ethiopia are making decision on where and when to invest
- Ethiopian government is putting in place strategies for coffee production until 2100, based on Kew's science data and expertise
- The science is now taught at Universities
- First set of Coffee Atlas sold out



Projections under climate change
Extinction risk



Royal Botanic Gardens Kew

Cefas' earth observation case study: Commonwealth Marine Economies Programme - Pacific

UK Government programme in Caribbean and Pacific Small Island Developing States.

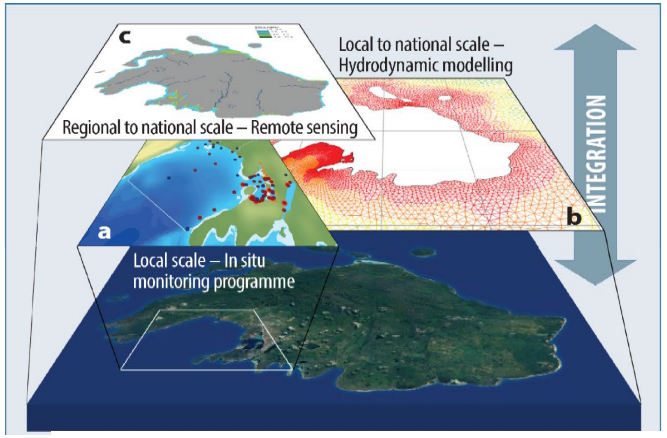
Supports sustainable initiatives to promote marine economic growth and prosperity.

Key Pacific issues include marine pollution and human health impacts, climate change and blue carbon potential (mangroves and seagrass).

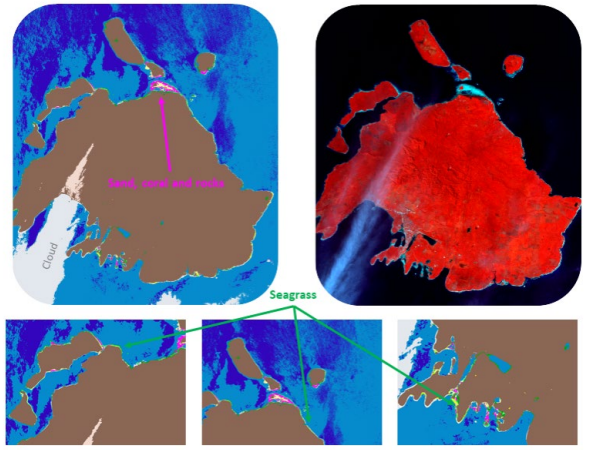
Pacific: Earth observation for pollution and blue carbon

Combine:
- EO (satellites/drones)
- *In-situ* monitoring
- Ocean modelling

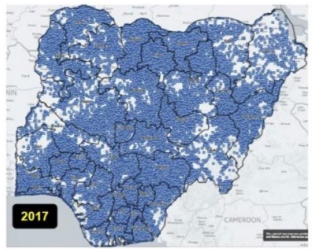
- Monitor on local and national scales
- Assess current situation, explore future scenarios



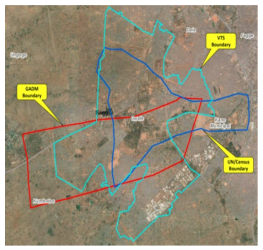
Assessing blue carbon habitats using satellite data: seagrass habitat map (left) of Efate Island, Vanuatu, derived from satellite colour data (right; false-colour image).



Enable all governments to collect, use and share geospatial data on population, settlement and infrastructure

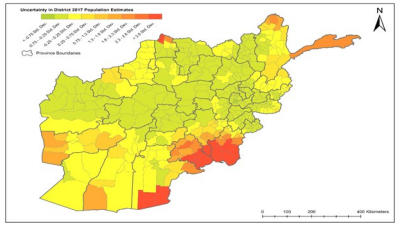


Infrastructure mapping



validation of admin boundaries

Comprehensive, systematic identification of settlements



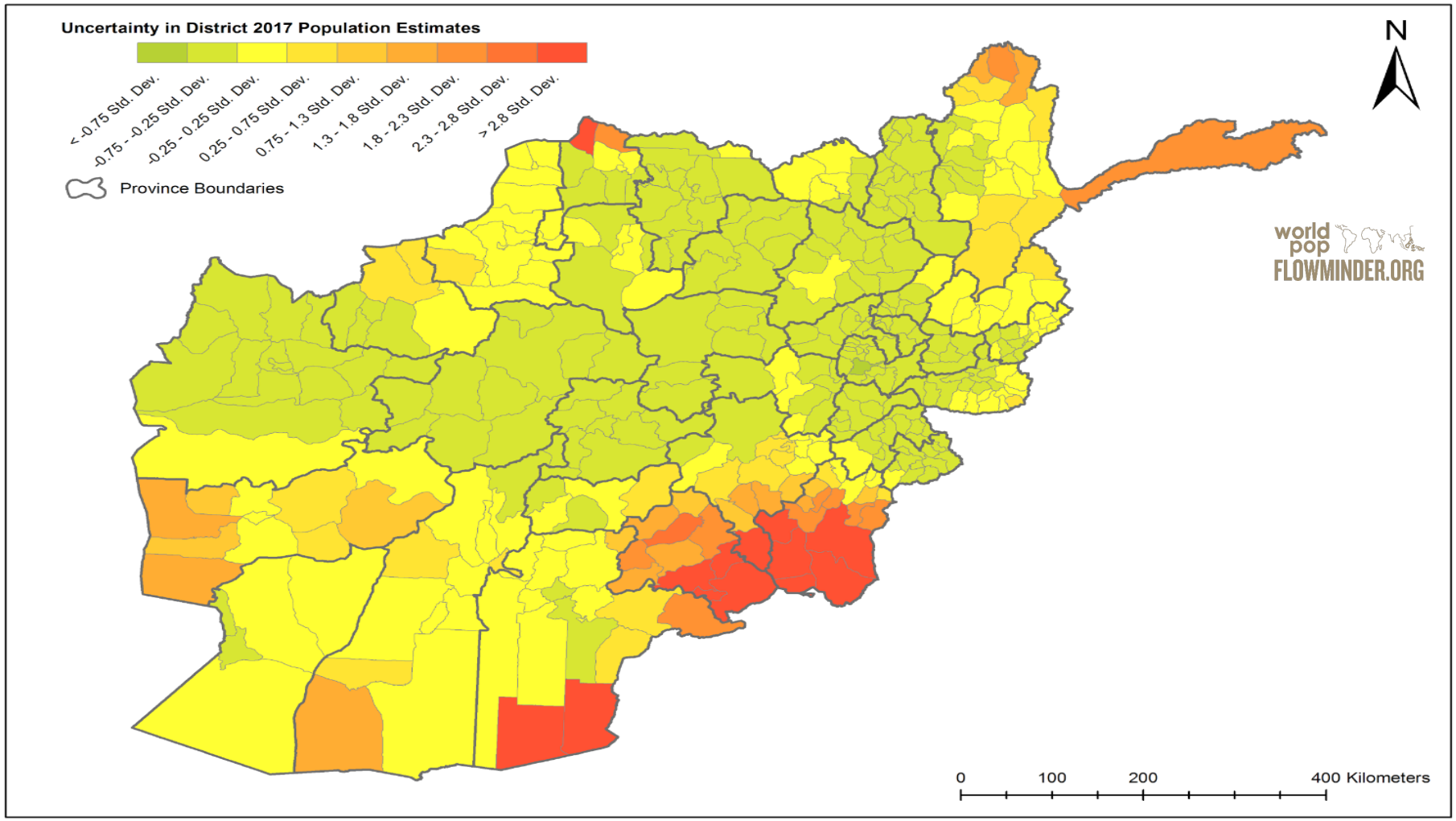
Population modelling

Inform service delivery

Improve national sampling frames

Map & disaggregate SDG indicators

Hybrid census, where needed


Uncertainty in District 2017 Population Estimates
< -0.75 Std. Dev.
-0.75 - -0.25 Std. Dev.
-0.25 - 0.25 Std. Dev.
0.25 - 0.75 Std. Dev.
0.75 - 1.3 Std. Dev.
1.3 - 1.8 Std. Dev.
1.8 - 2.3 Std. Dev.
2.3 - 2.8 Std. Dev.
> 2.8 Std. Dev.
Province Boundaries
N
world pop
FLOWMINDER.ORG
0
100
200
400 Kilometers

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Counting cattle using high resolution imagery

Estimate the post-war economy in South Sudan

Triangulate ground surveys and tether counts

Analysis options:

- Feature extract heads of cattle
- Feature extract herds of cattle and estimate based on density and distribution pattern
- Identify change between an image with cattle and an image without

Collaboration between ONS and DFID using the Data Science Campus

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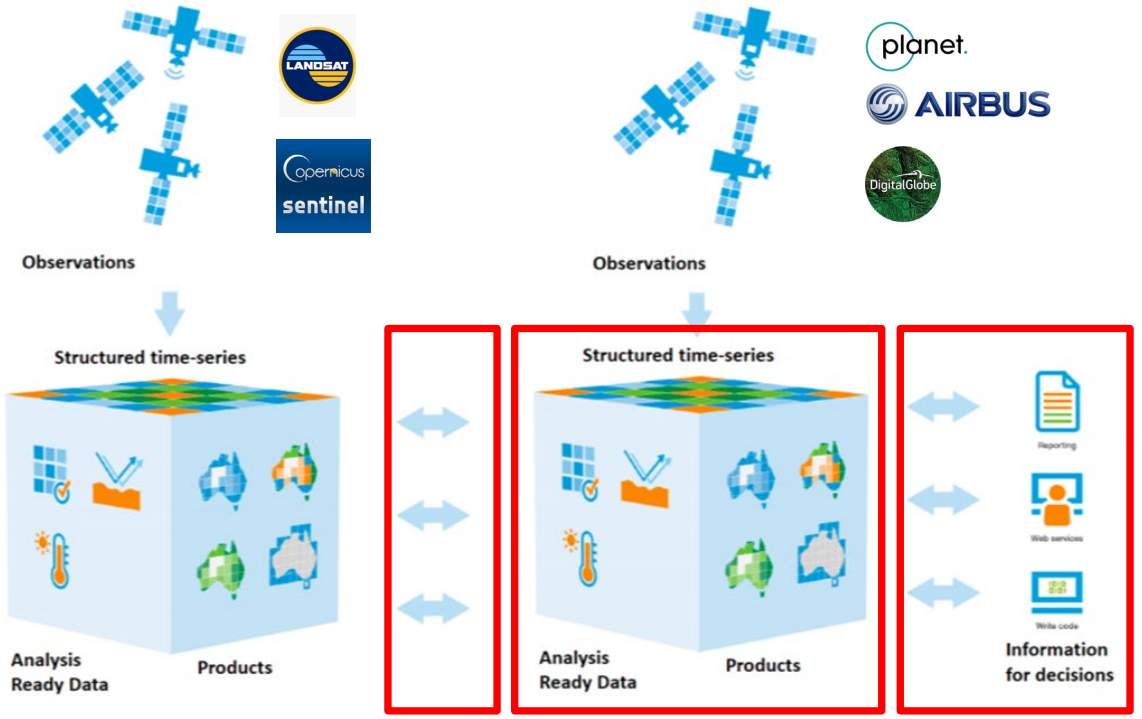
Digital Earth AFRICA
www.digitalearthafrica.org



Potential to underpin a greater exploitation of EO data across DFID's range of programmes

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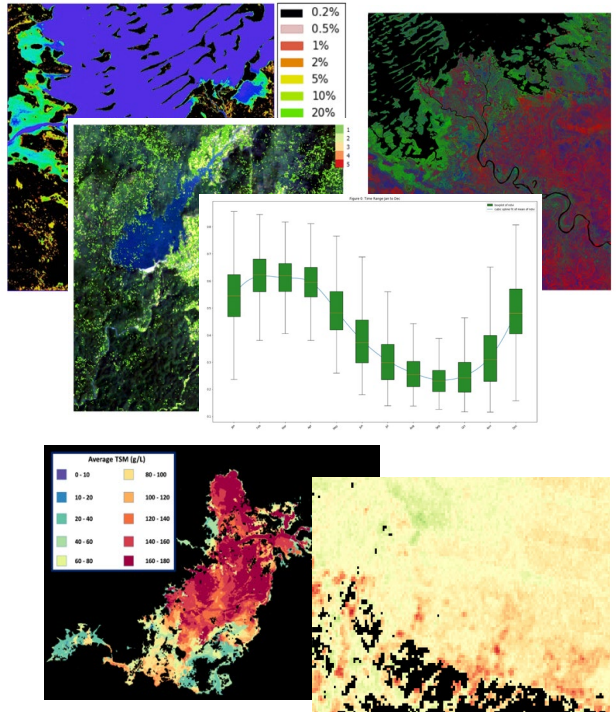
Africa Regional Data Cube

Decades of analytically ready data allowing easily accessible geospatial analysis. Initial focus on algorithms to address priorities identified by **5 countries**:

Ghana | Kenya | Senegal I Sierra Leone | Tanzania

20+ algorithms & 17+ years of data

- **Cloud-free Mosaics**
- **Spectral Indices**
- **Land Classification**
- **Water**
- **Land Change**



GEO GROUP ON EARTH OBSERVATIONS

Strathmore UNIVERSITY

Kenya Government

NASA

CEOS Committee on Earth Observation Satellites

esa

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International Partner Programme

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Deforestation / land use	Deforestation prevention	Vivid Economics	Côte d'Ivoire
	Forestry Management And Protection (FMAP) system	Astrosat	Guatemala
	Forests 2020	Ecometrica	Brazil, Mexico, Indonesia, Colombia, Ghana, Kenya
	Land-use interventions	Vivid Economics	Peru
	Peatland Assessment in SE Asia by Satellite (PASSES)	CGI IT UK Ltd	Indonesia, Malaysia
Agriculture	Advanced Coffee Crop Optimisation for Rural Development (ACCORD)	Earth-i	Rwanda, Kenya
	Crop Observation, Management and Production Analysis Services System (COMPASS)	Rezatec	Mexico
	EcoProMis	Rothamsted Research	Colombia
	EO4Cultivar	Environment Systems	Peru, Colombia
	Pest Risk Information SErvice (PRISE)	CAB International	Kenya, Zambia, Ghana
Climate/ Disaster resilience	CommonSensing	UNITAR	Fiji, Solomon Islands, Vanuatu
	Drought and Flood Mitigation Service (DFMS)	Rheatech	Uganda
	Earth and Sea Observation (EASOS)	Satellite Applications Catapult	Malaysia
	Flood and Drought Resilience	Airbus Defence & Space	Ethiopia, Kenya
	FireSat	Clyde Space	South Africa, Kenya, Namibia
	Modelling Exposure through Earth Observation Routines (METEOR)	British Geological Survey	Nepal, Tanzania
	SatComs for natural disasters	Inmarsat	Philippines
	Recovery and Protection in Disaster (RAPID)	Astrosat	Vietnam
	Satellite Enablement for Disaster Risk Reduction in Kenya (SatDRR Kenya)	Avanti Communications	Kenya
	SIBELIUs: Improved resilience for Mongolian herding communities	eOsphere Limited	Mongolia
Urban, infrastructure and industry	Space-based dam monitoring	HR Wallingford	Peru
	Property database for Dakar City	Airbus Defence and Space	Senegal
	Renewable Energy Space Analytics Tool (RE-SAT)	Institute for Environmental Analytics (IEA)	Seychelles, Mauritius, Montserrat, St. Lucia
	Spaced Enabled Monitoring of Illegal Gold Mining	Satellite Applications Catapult	Colombia
Maritime	Coastal Risk Information Service (C-RISE)	Satellite Oceanographic Consultants (SatOC)	Madagascar, Mozambique and South Africa
	Improved Situational Awareness in Fisheries (ISAIF)	Janus TCD	Philippines
	Satellite Enabled Maritime Domain Awareness (SEMDAC)	Satellite Applications Catapult	Chile
	South Africa Safety Initiative for Small vessels' Operational Take-up (OASIS-TU)	exactEarth	Madagascar, South Africa
	Satellites for sustainable fishing	Inmarsat	Indonesia
Education	iKnowledge	Avanti Communications	Tanzania
Health	Dengue fever Early Warning System (DEWS)	HR Wallingford	Vietnam
	SatCom for Nigerian Health Services	Inmarsat	Nigeria

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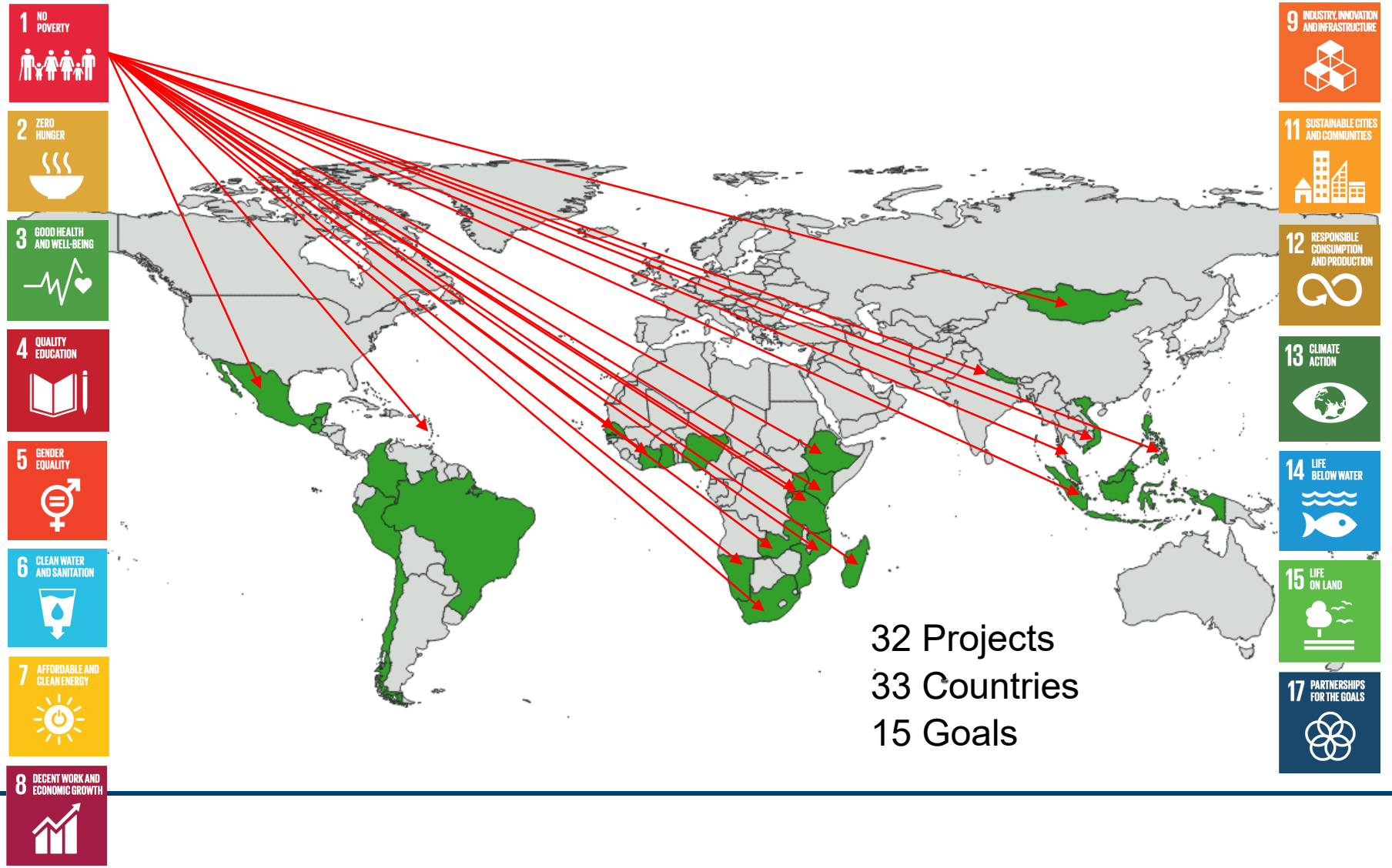
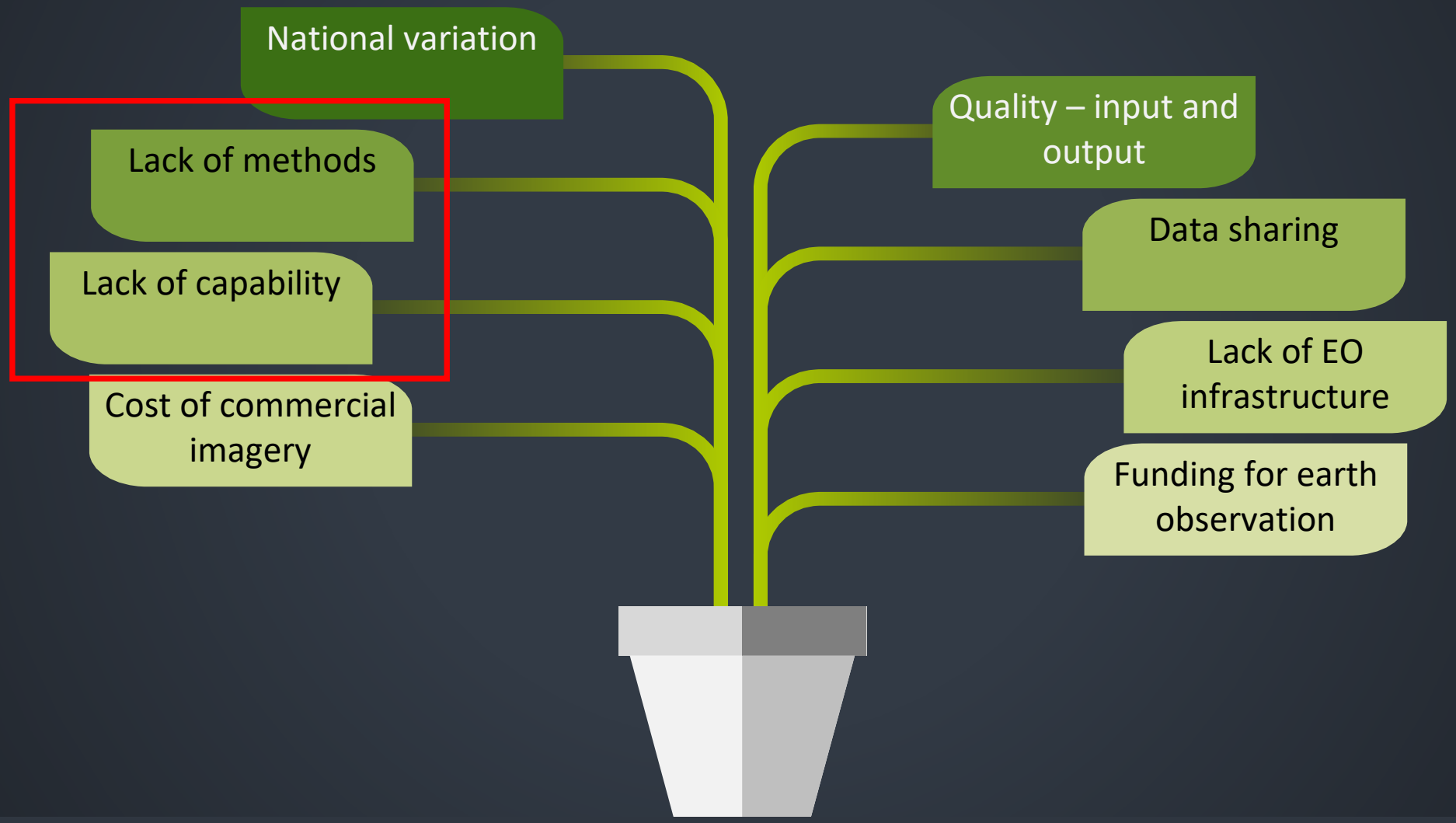
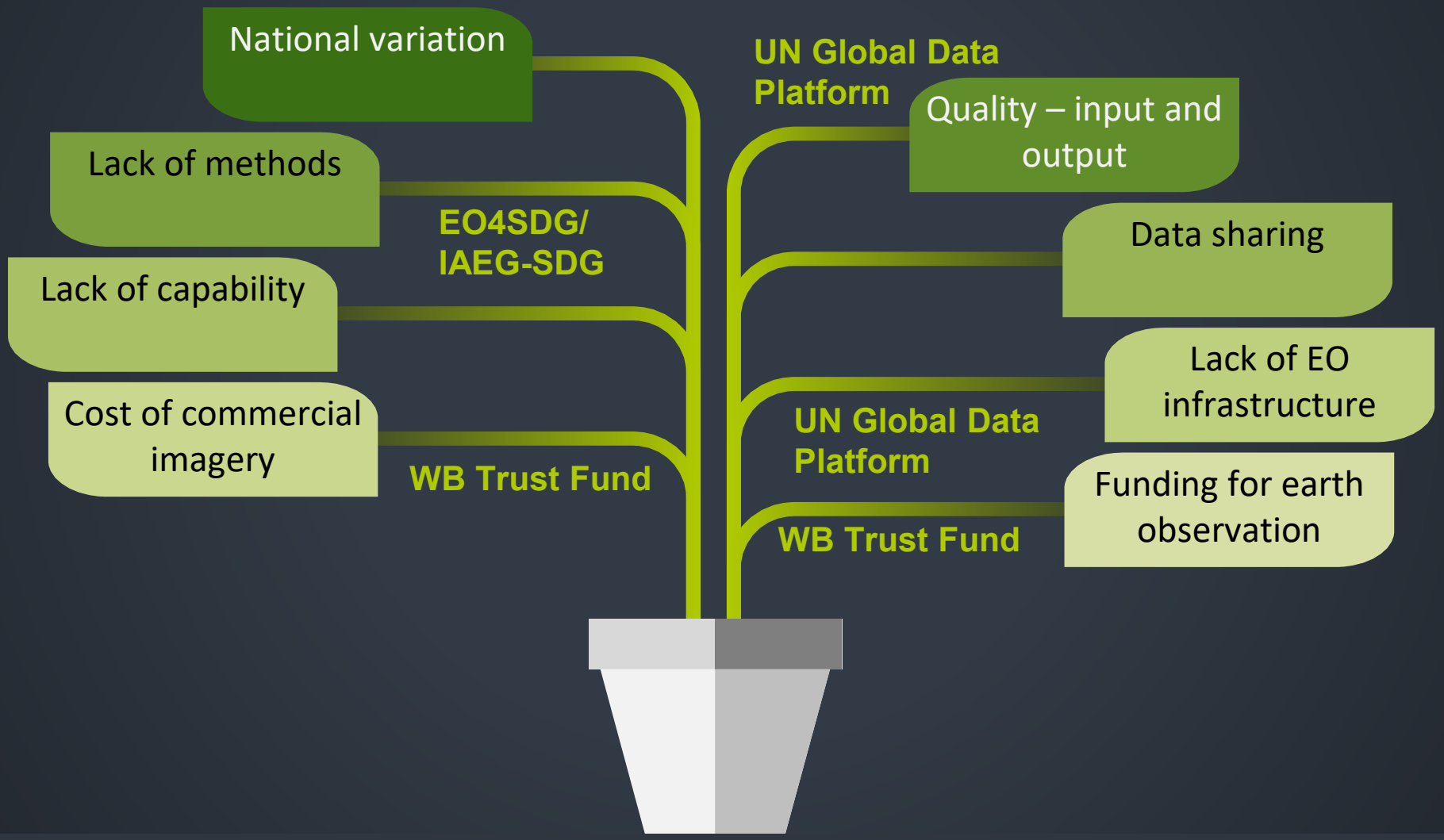


Growing the use of earth observation: Challenges



Growing the use of earth observation



Conclusion

Need more consideration of earth observation capability as an end-to-end process rather than just developing methodology and storage

UK should work towards collaborative test-beds for earth observation projects rather than siloed projects

Greater support is needed for technical infrastructure – difficult as tied to organisation specific architecture

How do we work collaboratively across other spheres of influence – statistical agencies, development agencies, geospatial agencies etc

FOCUS ON IMPACTS AND OUTCOMES

ANY QUESTIONS?