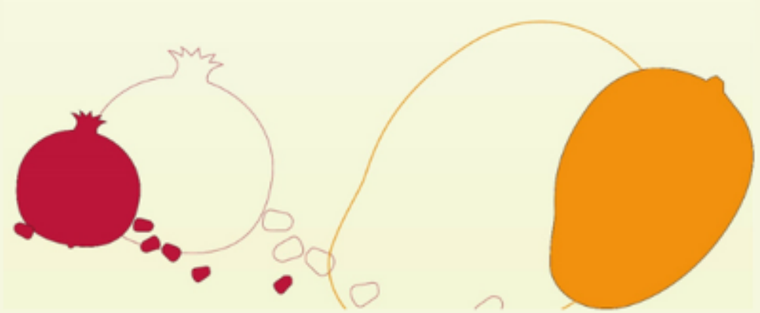
THE FRUITS AND VEGETABLES INDUSTRY SERIES

12 May 2026

The role of AI in the fruit and vegetable sector



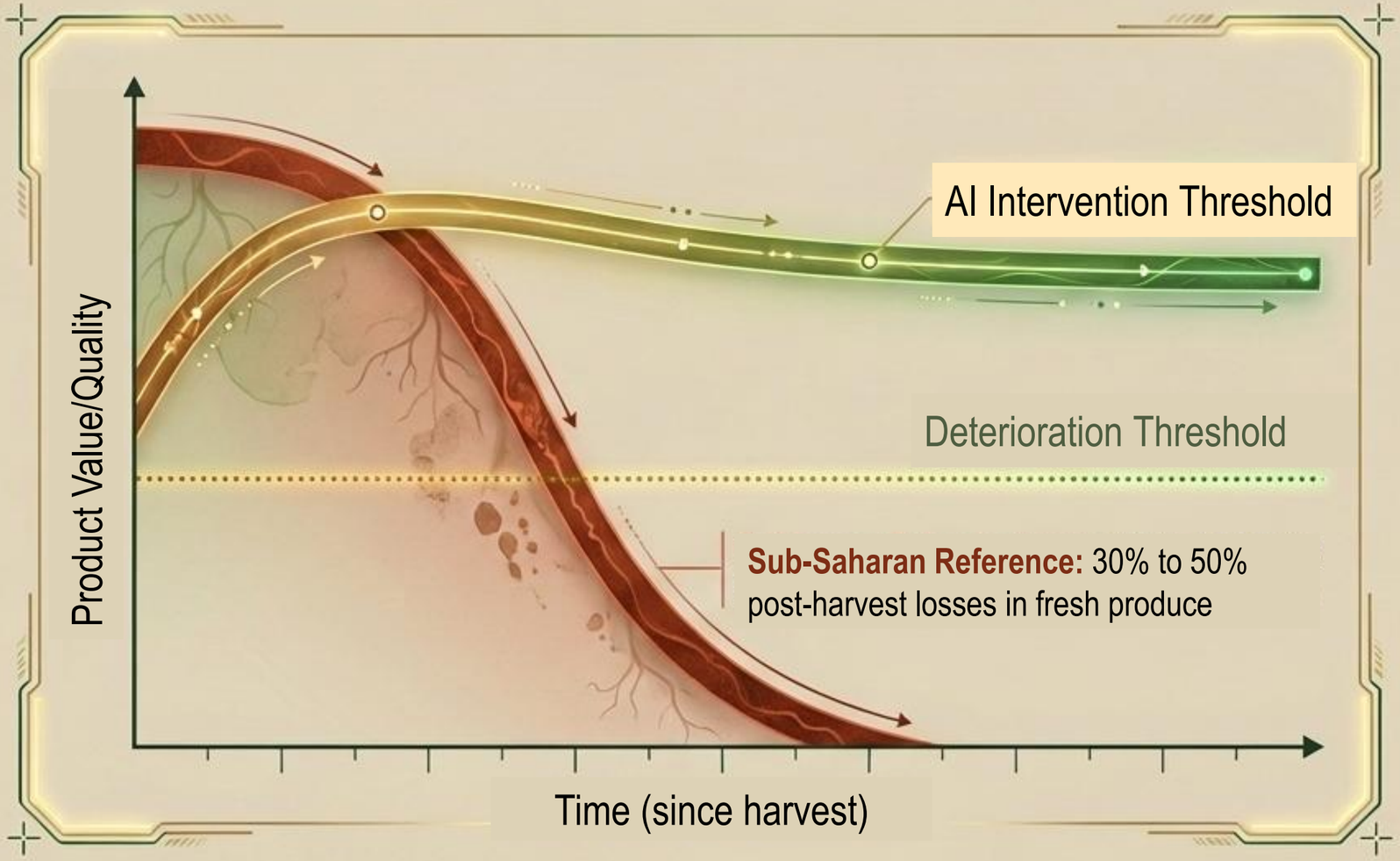
Funded by the European Union

The Digital Renaissance of African Horticulture

A strategic roadmap for investing in artificial intelligence in fruit and vegetable value chains

Focus: Sub-Saharan Africa
Sector: High-value perishable products
Key Technologies: Computer Vision, IoT Analytics, Predictive Machine Learning

Escaping the quality and perishability trap



Biological reality

Unlike staple grains, the value of fruits and vegetables (F&V) is strictly tied to time and their condition.
Minor delays result in total economic loss.

Market Imperative

AI-based standardization and traceability are immediate prerequisites for participating in the €3.4 trillion AfCFTA integrated market.

A €200 billion sector opportunity

Agriculture and Agribusiness | 20% / €200 billion

Highly processed, essential for food security and rural livelihoods

Wholesale and Retail | 14% / €140 billion

Finance and Inclusion |8% / €80 billion

Manufacturing and Industry 4.0 |9% / €90 billion

Health and Life Sciences |7% / €70 billion

2025-2027

Seed phase (setting the AI flywheel in motion)

Post-2027

Scaling up

Reducing uncertainty across the F&V life cycle

	Traditional Approach	AI-Driven Approach
Crop Management	**Reactive:** Application of chemicals after symptoms appear; guesswork based on experience.	**Proactive:** Yield modeling via ML; early warning systems. 
Quality Control	**Subjective:** Slow manual inspections; highly variable 	**Objective:** Computer vision grading; standardized digital language. 
Market Traceability	**Fragmented:** Paper logs; high friction for export. 	**Integrated:** Blockchain/AI logs; real-time regulatory compliance. 

The true ROI of AI in African horticulture is not just efficiency—it is the systematic elimination of climate, pest, and market uncertainty.

The intelligent value chain circuit

Precision production
From seed to harvest

Satellite data, soil IoT and computer vision

Post-harvest excellence
From sorting to compliance

Algorithmic quality control and regulatory data extraction

Cold chain frontier
From storage to port

Predictive maintenance and route optimization

Node 1: Anchoring AI in field reality

The data gap

Generic AI models struggle when local soils, climates and farming practices are not well represented. Affordable IoT soil diagnostics can provide missing local data layers. Satellite and farm-level data can improve yield forecasting.

Climate-Smart Agriculture (CSA)

AI predicts land management performance in the face of erratic rainfall and rising temperatures, transforming traditional knowledge into predictive climate resilience

Satellite imagery and weather forecasts
(Makerere University's Lake Kyoga Basin climate stress models)

ML yield prediction engine

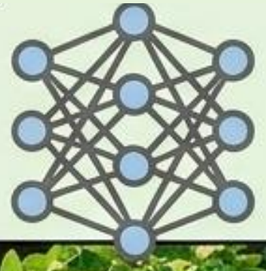
Soil nutrient maps
(Diagnostics Sesi Technologies / Umbaji FarmSense)

Mini-carte

Node 1: Eradicating the reactive chemical cycle

Solar camera scanner monitors a 600 m crop radius

Neural network analyses leaf morphology, colour and texture



Automated SMS alert provides targeted recommendations

Aggregated data helps community pest response

5 110
Active famers

40%
Yield increase

33%
Reduction in crop losses

Node 2: Digitising the language of quality

Friction vs. Flow

Friction
(Traditional)

20-page specification document

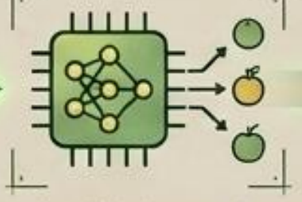
Interpreted by multiple humans (agricultural inspector, retail buyer)

Subjective grading

High rejection rates

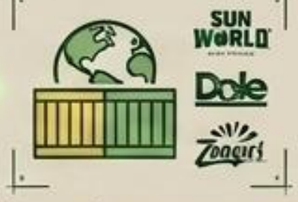
Flow
(AI-driven, e.g., Clarifresh)

Image capture via smartphone



Sub-second algorithmic analysis (assessment of size, color, stem condition, external defects)

Standardized numerical language



Accelerated for global brands (Sun World, Dole, Zespri)

Operational advantage

AI-powered computer vision eliminates human bias and enables a 50% to 100% larger inspection sample size, significantly reducing waste due to classification errors and justifying premium market prices.

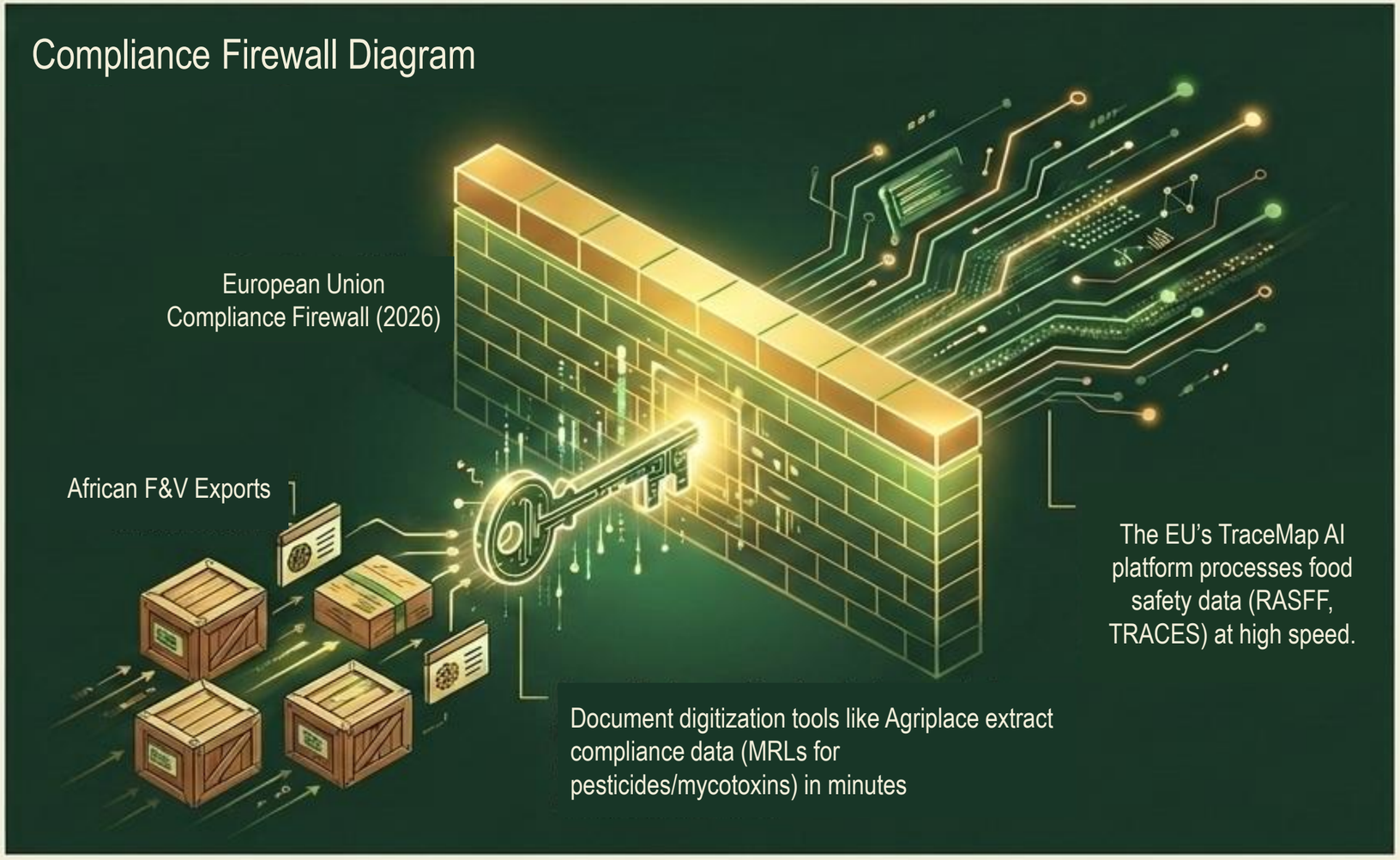
Node 2: Traceability as a regulatory control point

The mandate

By 2026, the European Commission's TraceMap will aggressively detect fraud and security breaches using AI

Regulatory Watch

Manual audits take weeks and risk causing food spoilage.
AI-powered document automation verifies international safety compliance in minutes, ensuring zero friction at the border



Node 3: Cold chain as an intelligent service

IoT cooling loop as a service

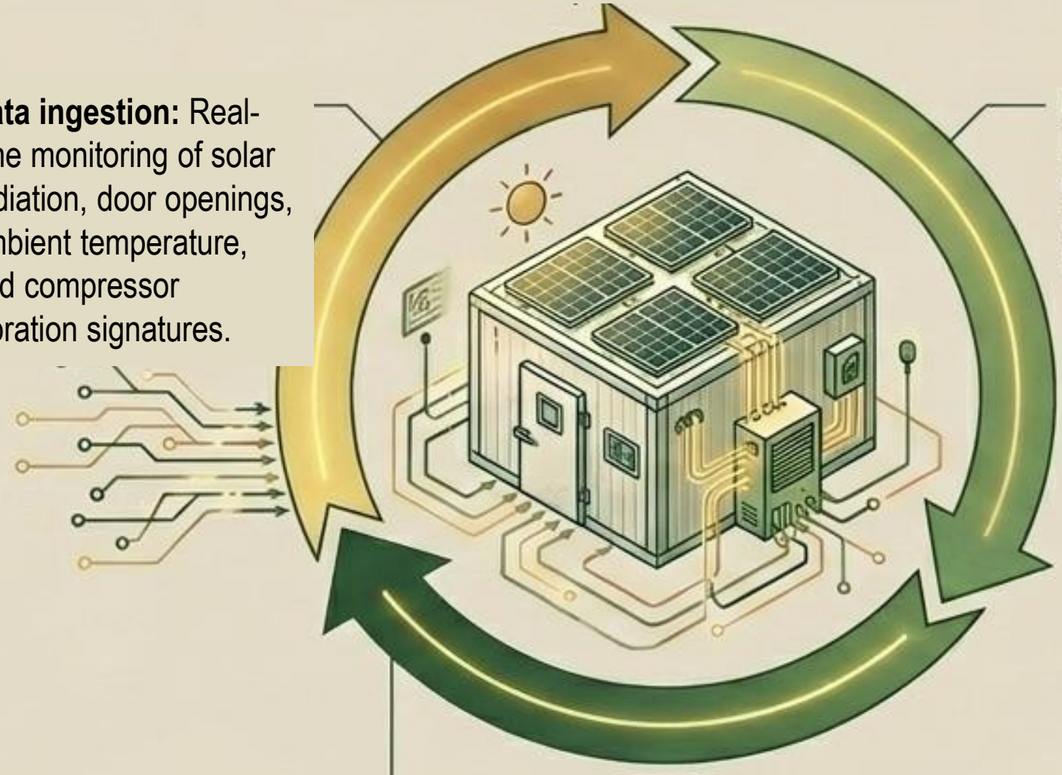
ColdHubs (Nigeria)

Extended shelf life from 2 to 21 days on a pay-as-you-go model

42,000 tons of produce saved

1 million kg of CO2 reduced.

Data ingestion: Real-time monitoring of solar radiation, door openings, ambient temperature, and compressor vibration signatures.



Result: Optimized energy use and uninterrupted cold chain

AI prediction engine: Analyzes compressor cycles to predict equipment failures before they occur (predictive maintenance).

InspiraFarms (East Africa)

Pre-cooling intelligence reduces energy costs by up to 25%

Making sea freight viable compared to air freight

The Agricultural AI Technology Landscape in Africa

	VC/Imaging	IoT/Hardware	Predictive ML
Production	**Agrix Tech** (Instant mobile disease diagnosis)	**Hello Tractor** (Fleet Management / Land Preparation)	**Penn State AI App** (Pathogen identification via deep learning for cassava/potatoes)
Post-Harvest	**Clarifresh** (Algorithmic quality grading)	**Agriplace** (Automated Document Compliance)	**ColdHubs** (Decentralized Solar Smart Storage)
Logistics			**InspiraFarms** (Energy Optimization for Cooling as a Service)

The Super-Smart Food System

A Soil data and computer vision at the farm level provide accurate yield forecasts

B Accurate yield forecasts optimize routing and scaling of cold chain logistics.

C Uninterrupted cold chains and structured data meet strict EU Tracemap compliance requirements.

D **The Flywheel**

Market premiums and compliance data feed into local machine learning models, improving the accuracy of the following season's crop planning

The true value of Agro-AI is not localized efficiency; it is the creation of a unified, self-optimizing data asset that constantly recalibrates Africa’s food supply against global demand.

The Fundamental Enablers: Sovereignty and Human Capital

Data Sovereignty (The Kigali Mandate 2025)

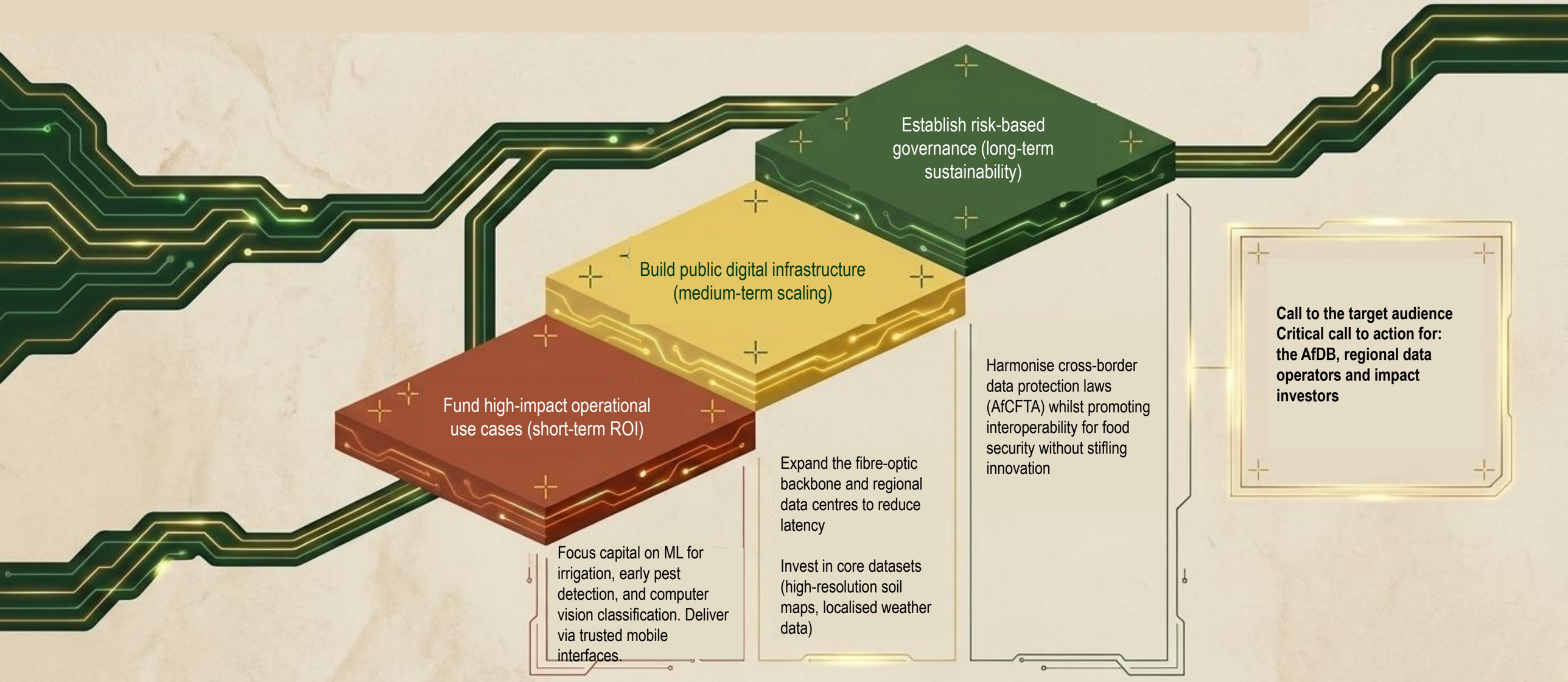
Preventing digital colonization. African data must be hosted locally to train models on the authentic challenges of tropical crops and multilingual NLP (e.g., Yodi).

Capacity Building (Generation Z)

Addressing the crisis of an aging farming population. AI4D initiatives at Makerere University training Master's/PhD students to ensure solutions are built where they are deployed

AI systems must integrate into existing social structures (extension workers, SMS, WhatsApp) to gradually build trust with smallholder farmers.

Strategic Roadmap: Implementation of the seed phase



The Ctrl+Alt+Refresh of African horticulture

We are in the early stages of an economic revolution. AI is no longer just another novelty; it is an essential public infrastructure

By filling historic information gaps, AI is transforming a reactive, high-risk sector into a smart, inclusive and globally competitive engine of wealth

The future of the continent’s agriculture is not imported; it is smart, resilient and continent-led.

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Thank you

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FRUIT AND VEGETABLES SCHEME

FIT FOR MARKET+

Funded by the European Union

The OECD-COLEAD Fruits and Vegetables Industry Series focuses on market access conditions and opportunities for the fruit and vegetable sector, especially for fruit and vegetables producers and exporters from ACP-countries. This activity is supported by the Fit For Market Plus (FFM+) programme, implemented by COLEAD within the framework of development cooperation between the Organisation of African, Caribbean and Pacific States (OACPS) and the European Union (EU)