

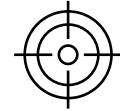
Harnessing AI and Digital Innovation in CGIAR

A Concept for an AI-First Open Innovation Accelerator e-Hub for CGIAR

October 2023



CGIAR Digital Ambition



CGIAR 2030 Research and Innovation Strategy

“CGIAR will make the digital revolution central to its way of working.”

Why Digital Transformation

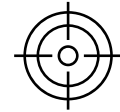


1010 1010 Digital Transformation

Digital technologies are enablers of organizational and research innovation and an essential part of building new pathways for research delivery and impact amid rapidly digitizing societies and economies.

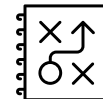
The design of **Data ecosystems**, infrastructures for the secure and reliable data exchange among organizations, is considered one of the key technological enablers for digitalization and the digital economy of the future.”

Source: Cappiello, et al. 2019



Strategy

“CGIAR will make the digital revolution central to its way of working.”



Challenge

How to **ensure** that the benefits of the **digital revolution reach the millions of farmers**, agri-food businesses, and developing economies whom CGIAR research and innovations are intended to **serve?**



Theory of Change

Making the digital revolution central to our way of working will enable CGIAR to effectively deliver and share the benefits of the digital revolution to All

A digital and data-empowered CGIAR will operate with **agility** and **efficiency**, driving digital **innovation** in agricultural research and **impact.**”

STRATEGIC ANALYSIS | megatrends

We can expect increasingly intense challenges across demographic, natural resource, ecological, and climatic dimensions; the window of opportunity for mitigating these is quickly closing.

STRATEGIC
ANALYSIS |
Digital
megatrends

Global, unequal expansion of internet and connected devices

Accelerating innovation in digital technologies and the life sciences

Global crisis of (digital) trust

STRATEGIC ANALYSIS | Digital megatrends



Talent Availability

Decentralized workforce

Hybrid workforce

Diverse workforce

Skills gap

Digital workforce

Multigenerational workforce



Customer Expectations

Personalization

Digital experience

Data ownership

Transparency

Accessibility



Technological Landscape

AI & robotics

Virtual world

Ubiquitous connectivity,

Genomics

Materials (smart, nano, bio)



Regulatory System

Market control

Economic shifts

Digital regulation

Consumer protection

Global green



Supply Chain Continuity

Resource scarcity

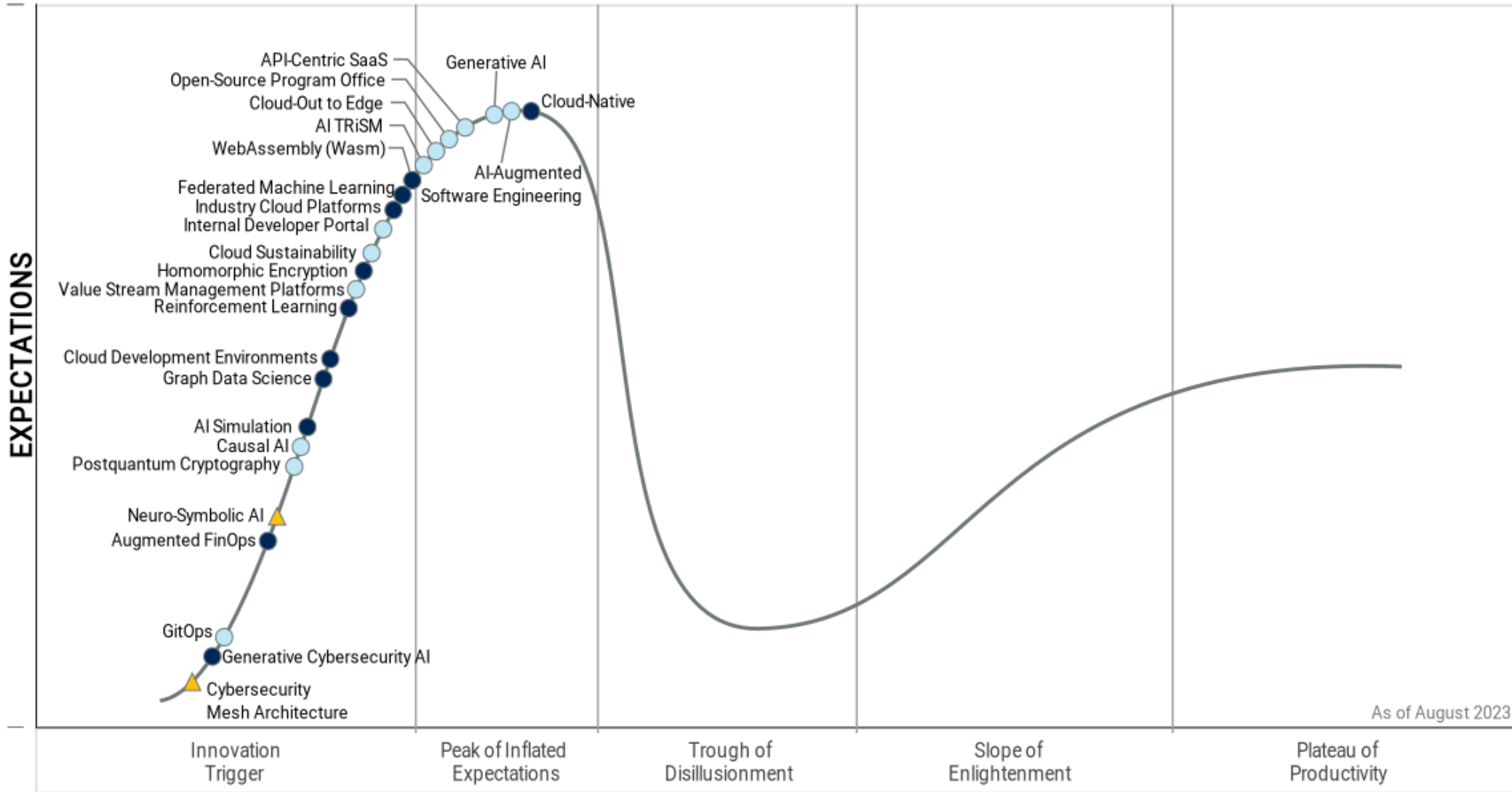
Sustainability

Supply chain digitization

Circular supply chains

Agility

Hype Cycle for Emerging Technologies, 2023



Plateau will be reached: ○ <2 yrs. ● 2-5 yrs. ● 5-10 yrs. ▲ >10 yrs. ⊗ Obsolete before plateau



CGIAR
Science for a food-secure future

Towards an AI-First Open Innovation Digital Transformation at CGIAR

The Opportunity, the challenge, and proposed strategy

October 2023

The Opportunity



Why AI

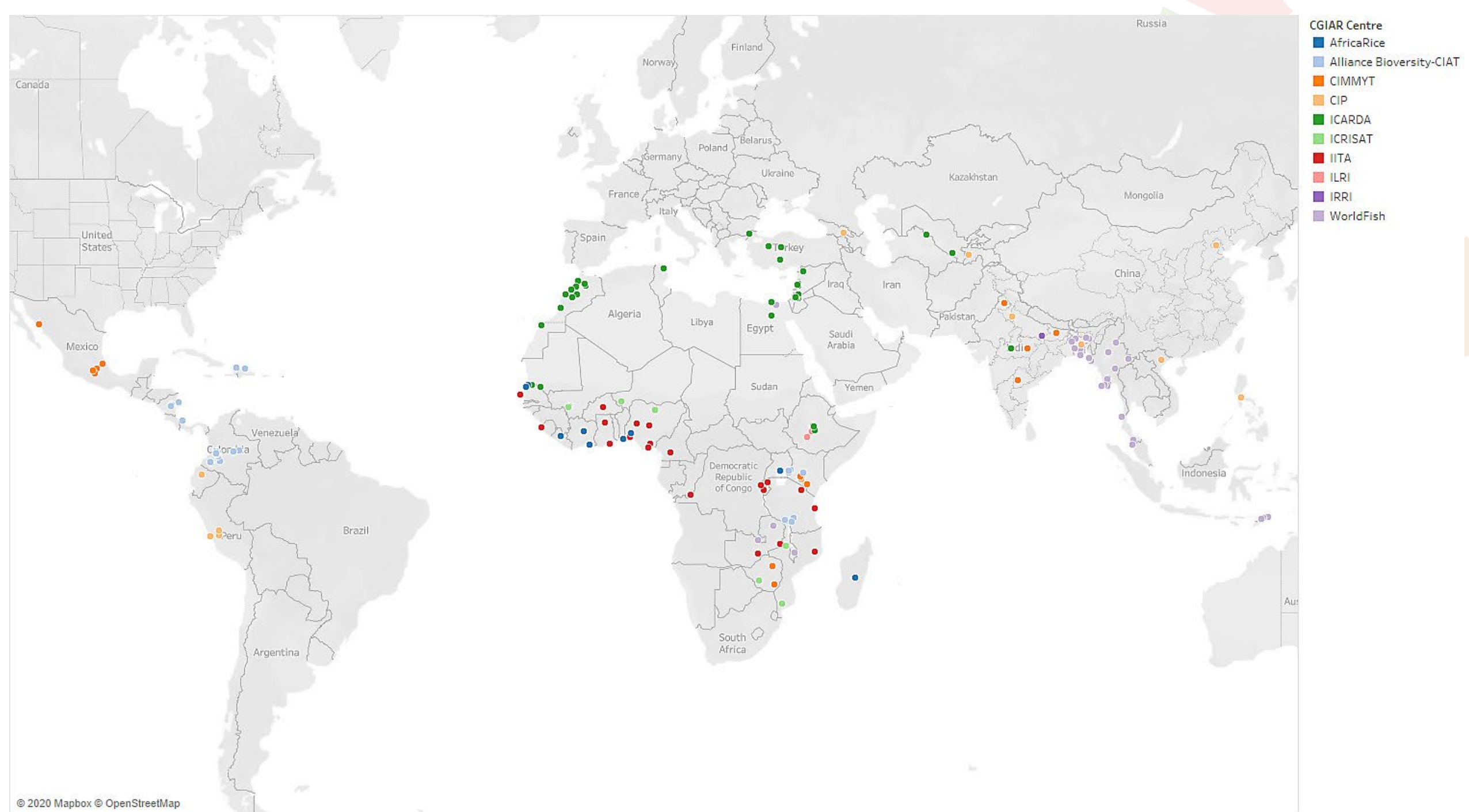
Artificial intelligence (AI) presents a significant opportunity for improving productivity, profitability, and sustainability in global agrifood systems.

Why CGIAR

CGIAR—the world’s largest agricultural innovation network—has **unique comparative advantages** for fostering AI in diverse contexts through its **13 Research Centers in 89 countries** and more than **3,000 partners** from national governments, academic institutions, private companies, and NGOs.

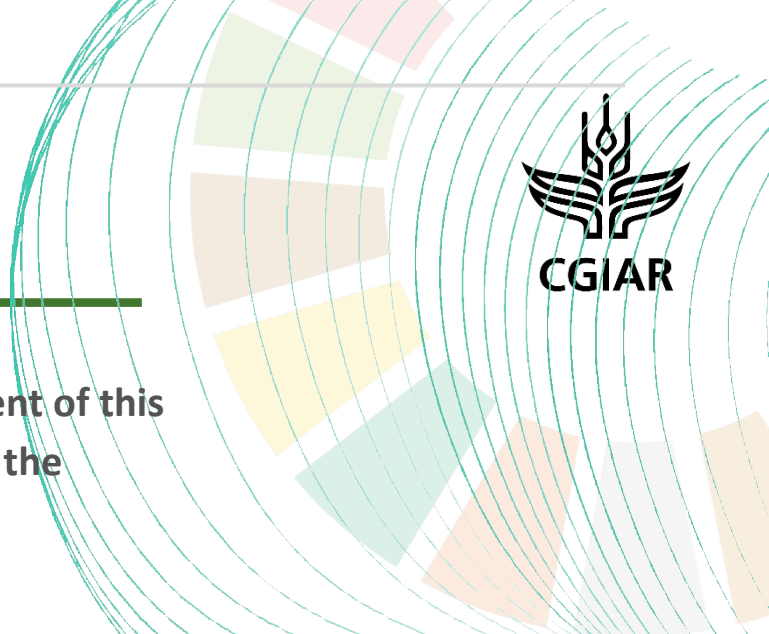
AI @ CGIAR

CGIAR scientists use AI/ML methods to **analyze large volumes of data from satellite remote sensing, household surveys, agronomic trials, and soil and weather**. Use cases range from **crop yield prediction, pest monitoring, and modeling farmers’ behavior under climate change**. AI/ML is already being widely used to answer complex research questions, and our scientists realize its potential for agricultural research for development.



Challenges

AI can introduce new risks to global food systems that are still poorly understood. Development of this powerful technology is led by a handful of elite institutions, and AI is evolving faster than are the establishment of regulations or ethical frameworks to guide its responsible use.



BIAS

AI development requires both deep domain knowledge and representative reference data, yet underrepresentation and poor availability of data from the global South can increase the risk that AI services advance inaccurate or harmful analyses and worsen social or economic exclusion. **Inclusive, open action research is needed**

AGENCY & OWNERSHIP

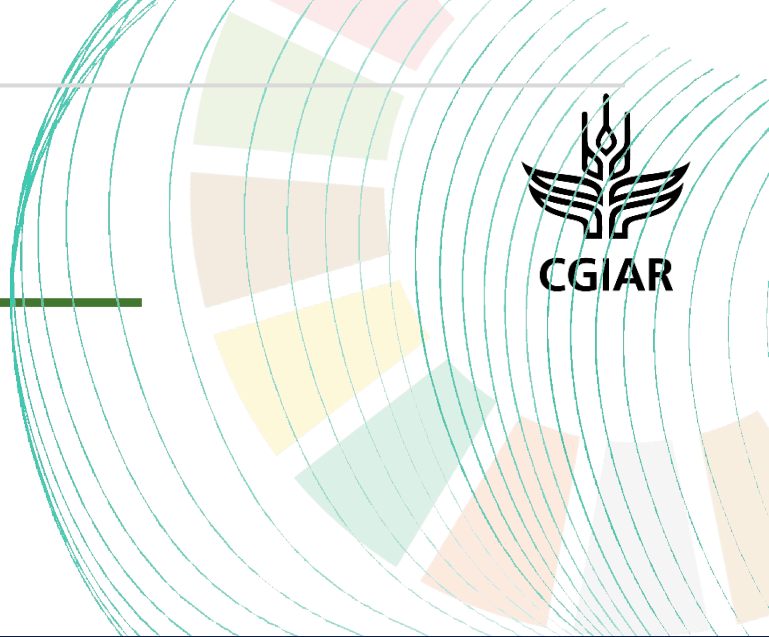
Limited AI development capacity and computational infrastructure in the global South hinder the development of AI for agri-food systems guided local needs and context.

A multifaceted approach is required to democratize the development use of this powerful technology.

ETHICS & GOVERNANCE

AI is evolving faster than are the establishment of regulations or ethical frameworks to guide its responsible use, and universal approaches have proven elusive. **Localized, iterative, multi-stakeholder approaches are needed to manage tradeoffs between multiple objectives and goals.**

Strategy



CGIAR and its global network of partners to harness AI responsibly by focusing on three mutually reinforcing objectives:

1. OPEN SCIENCE

CGIAR will enable the independent research needed to foster AI development and responsible use in food, land, and water systems in a diversity of contexts.

2. OPEN INNOVATION

CGIAR will nurture open, responsible, human-centered AI innovation in agricultural research and global food, land, and water systems.

3. OPEN GOVERNANCE

CGIAR will establish inclusive, agile governance at the interface of open science and AI innovation in diverse contexts

Open Science



Accelerate applied open science

1.1 Action research

CGIAR and its partners will explore the AI theory of change in context and:

- **developing capacity** and validate methods for its application;
- manage evolving AI its risks through **policy**; and
- setting promising **innovations** on a path to scale.

1.2 AI Product Families

CGIAR will advance development and testing **AI-enabled products in science areas** of the One CGIAR research portfolio:

- *Resilient Agrifood Systems,*
- *Genetic Innovation, and*
- *Systems Transformation*

1.3. Open Science Infrastructure

CGIAR will:

- steward **machine-actionable data** for training AI, leveraging CGIAR's network of 100+ research stations and partner networks;
- Host **open analytic pipelines** for common research areas; and
- Sustain **scientific computing power** needed to develop and apply AI models in new contexts.

AI – enabled product families

1.2a Resilient Agrifood Systems

- **AgWise Decision Support Framework (Excellence in Agronomy): *data transformation and large language models.***

1.2b Genetic Innovation

- **Global Market Intelligence Platform: large language model-assisted demand for product profiles**
- **Alphafold for rice discovery (Google AI for Good)**

1.2.c Systems Transformation

- **“Deforestation free”**
Commodities: AI accelerated analysis of large volume of remote sensing data—getting multiple value chain actors ready for regulatory compliance.

Open Innovation

2. Build global open innovation



2.1 Grants, Challenges, and Prizes

CGIAR and its partners will **co-design and test processes** to source, foster, evaluate, and accelerate an array of AI innovations.

2.2 Multi-stakeholder innovation ‘funnel’

Partners **co-design, co-develop, and cull AI-based innovations** for research impact and operational effectiveness.

2.3. Analytic ‘Sandboxes’ CGIAR and partners conduct **rapid prototyping** and pilot testing of novel AI techniques that can take place in actual, local, and fully-monitored agricultural contexts.

+
Synthetic data to **address data privacy concerns**

2.4 Crowd in co-investors

CGIAR and partners **mobilize funding and in-kind support** at every stage in the innovation pipeline; growing the CGIAR AI Interest group into an “impact network” of public, private, and non-profit contributors.

Open Governance



3. Engender open governance

3.1 Establish Formal governance

CGIAR will establish a **Steering Committee with representatives of internal stakeholder groups** (e.g. System Organization, Science Groups, Centers) and external partners (e.g. private industry, national agricultural research and extension, and funding organizations)

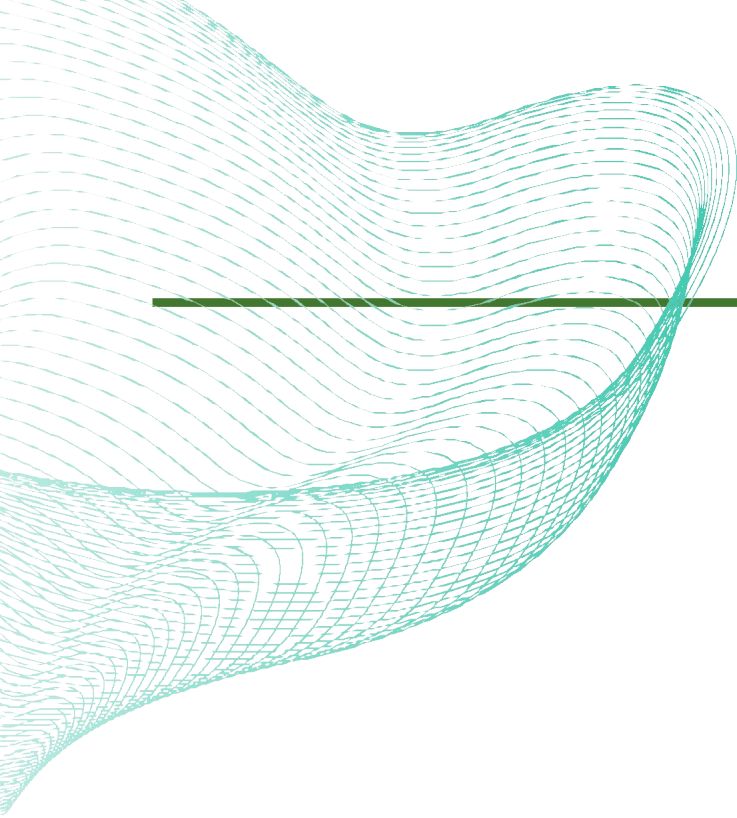
3.2 Convene an “impact network”

CGIAR will mobilize internal external experts to **accelerate collective, adaptive learning, use-cases and management of AI innovation:**

The pan-CGIAR ‘AI e-Hub’ Center of Excellence

3.3. Research governance itself

CGIAR will **make AI governance an area of active research**, testing, learning, and adaptation in service of responsible, human-centered innovation.



Next Steps

Validate with One CGIAR initiatives

Digital Innovation initiative has planned pan-initiative meetings on digital innovation, will take the opportunity validate needs and approach.

Link with Science Program areas

Design the next iteration of initiatives with Science Area leads to build enduring whole –of – organization AI innovation capability.

Fundraise around the objectives

In addition to elevating the concept through internal structures, several funding partners have an interest in some of the objectives and sub-objectives (e.g. digital public infrastructure, open models and science, open analytic pipelines, responsible AI Innovation).



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