Digital Transformation Accelerator

Full design document
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List of acronyms

Acronym/abbreviation	Explanation
AI	Artificial intelligence
AoW	Area of Work
AR4D	Agricultural research for development
ARI	Academic and advanced research institution
ATRC	Advanced Technology and Research Council
BMGF	Bill & Melinda Gates Foundation
CoP	Community of practice
FAIR	Findable, accessible, interoperable and reusable
FLW	Food Land and Water (Systems)
GenAI	Generative AI
GESI	Gender and social inclusion
HCD	Human-centered design
IP	Intellectual Property
ISDC	CGIAR Independent Science for Development Council
LLM	Large Language Model
MEL	Monitoring, evaluation and learning
MELIA	Monitoring, evaluation, learning and impact assessment
MiniSASS	Mini-stream assessment scoring system
MDII	Multidimensional Digital Inclusiveness Index
NARES	National agricultural research and extension systems
NGO	Non-governmental organization
RHoMIS	CGIAR Rural Household Multi-Indicator Survey
UAE	United Arab Emirates

1. Executive Summary

Digital transformation offers solutions to the complex challenges facing food, land and water (FLW) systems through real-time monitoring, advanced data analytics, and connecting stakeholders at scale. CGIAR has a key role to play in localization digital frontier technologies by adapting these solutions to the Global South while promoting digital inclusivity and equitable access to technology. To do so, CGIAR must adapt at an institutional and cultural level, developing new partnerships and workflows to adopt digital advances.

The Digital Transformation Accelerator will work with CGIAR and partners to co-design inclusive solutions building on advances in modeling, artificial intelligence (AI), machine learning, and big data analytics. Outcomes such as improved decision-making, enabling policies and investments, and increased adoption of digital solutions by stakeholders and actors will provide a foundation to address CGIAR's five Impact Areas more effectively.

Digital Transformation will continue select research and innovation from CGIAR Initiatives on Digital Innovation, Breeding Resources, and Excellence in Agronomy, CGIAR Digital & Data Group, and bilaterally supported digital research and development projects across Centers, based on use case-based prioritization. Addressing data challenges identified in the previous Portfolio, Data Ecosystem (AoW1) will enhance data sharing across Centers and develop advanced analytics in a collaborative way, focusing on the implementation of FAIR (Findable, Accessible, Interoperable, and Reusable) principles, inclusive governance, and cultural change processes. Through Action Lab (AoW2), Digital Transformation continues innovations from the Digital Innovation Initiative, co-developing prioritized use cases with stakeholders, accelerating the development of digital and AI-driven innovations and insights, and addressing inclusivity through citizen science, gender and social inclusion, and human-centered design approaches. This process will largely define the targeted geographic area. Digital Futures (AoW3) will develop a series of foresight case studies to identify digital frontier technologies with the opportunity to transform FLW systems, facilitating critical discussions to address the risks of widening technological divides and inequalities. Enabling Environment (AoW4) will establish a decentralized network of Digital Innovation Hubs for CGIAR and its stakeholders to access expertise, resources, and collaboration opportunities. It will lead where digital transformation intersects with gender and social inclusion, scaling and capacity sharing, ethics, data governance, behavioral change, and business development. Digital Transformation will also provision a digital core of infrastructure, tools, and communities of practice, as the backbone of the digital transformation of CGIAR.

Driven by strong demand identified in Listening Sessions in 14 countries in the Global South, emerging use cases include AI models, especially large language models, to interact with CGIAR's data and knowledge products, including agronomic and crop breeding data for resilient productivity, bringing in citizen science and engaging youth, and embedding a data-to-analytics workflow across all Programs. Use cases matured in the Accelerator will scale through the Scaling for Impact Program for broader implementation.

Success for the Accelerator requires institutional support and significant resources including technical talent, domain knowledge, infrastructure, partnerships, datasets, and capacity building. While CGIAR holds comparative advantages in these areas, other partners will be brought in to leverage specific advantages in the digital domain on a mutual benefit basis, whether it be greater financial resources and technological expertise, or greater understanding of local

contexts. Key sources of external resources will include the Bill & Melinda Gates Foundation (BMGF), the Advanced Technology and Research Council (ATRC), and Google.org.

As a result of the Accelerator, CGIAR will aim to be a thought leader in digital and data science research across food, land, water, and climate systems, accelerating the delivery of research and digital services responsibly using data and tools such as AI, and improving decision-making based on evidence and insights into complex systems.

2. High-level vision in response to challenges and megatrends

2.1 Challenges and megatrends

This Accelerator addresses complex challenges posed by interconnected Megatrends such as shifting demographics (MT1), consumption patterns (MT2), climate change (MT4), environmental degradation (MT5), and persisting inequalities (MT8). Strategic use of frontier digital technologies and innovation (MT9) is crucial for addressing complex and interconnected problems including climate change, environmental degradation, changing consumption patterns, and persisting poverty and gender inequality. FLW systems are already undergoing a rapid digital transformation but much of the Global South remains relatively data-sparse. Digital advances are not always translated to local realities, and timely data-driven decision-making remains challenging. Increased digitization also offers opportunities to enhance resilience and efficiency. Ensuring the global South benefits from these innovations requires targeted development addressing the needs of vulnerable populations.

Responding to FLW challenges and seizing innovation opportunities involve new capabilities and culture change for best practices in data management and analytics across CGIAR and its partners; responsibly harnessing new and emerging data science and AI abilities to accelerate locally relevant solutions; and both leveraging rural youth interest and striving for gender equity in digital opportunities. Further, collaboration and capacity sharing are essential for detecting and assessing future digital opportunities and integrating these into inclusive and ethical, demand-driven digital solutions.

2.2 High-level vision

Digital Transformation envisions a future where advanced digital technologies and research-based, data-driven, and locally adapted digital innovations accelerate FLWs' transition towards sustainability and inclusivity in the global South.

Digital Transformation empowers CGIAR and its partners to harness digital frontier technologies such as AI, machine learning, and big data analytics by providing a collaborative platform, technical expertise, and enabling resources, to develop innovative solutions that improve productivity, enhance natural resource management, and build resilience in vulnerable communities through data-driven decision-making and targeted interventions. By creating quality data assets that can be easily and rapidly used to co-develop and deploy digital solutions, and by building capacity to inclusively use and benefit from digital technologies, the Accelerator enables CGIAR and partners to tackle complex, interconnected issues at multiple scales.

This approach accelerates scientific discovery in FLWs, facilitates evidence-based decisions, and drives responsibly created global digital public goods that address critical research needs. It connects grassroots stakeholders with high-level decision-makers, rapidly scaling technologies across the Global South. Digital Transformation aims to bridge the digital divide by developing digital solutions designed to address challenges faced by small-scale producers, youth, women, and marginalized communities, ensuring they can equitably benefit from technological advancements. By fostering a collaborative culture of digital and data innovation in CGIAR

Programs and bilaterally supported projects across Centers, Digital Transformation will amplify the impact of research and innovation efforts, leading to more rapid development and deployment of increasingly local climate-smart, nutrition-sensitive, and inclusive solutions. This aligns closely with CGIAR's mission to deliver science and innovation that advance transforming systems in a climate crisis.

Digital Transformation's outcomes, including enhanced data interoperability, AI-ready datasets, and ethical, inclusive digital solutions will provide a foundation that addresses CGIAR's five Impact Areas more effectively, ultimately contributing to poverty reduction, improved food security, gender equality, climate adaptation, and environmental sustainability in the face of evolving global megatrends.

2.3 What is new in this Accelerator?

Digital Transformation explores several cutting-edge areas in response to strategic shifts identified in the ISDC Megatrends Study, addressing challenges and constraints identified in the previous Portfolio using digital frontier technology and AI innovations. AoW1 Data Ecosystem offers an AI-ready, federated data ecosystem with a high-performance hybrid cloud computing environment, addressing challenges in data interoperability and collaborative analytics. AoW2 Action Lab and AoW3 Digital Futures position CGIAR at the forefront of applying advanced AI to accelerate research and innovation, including generative AI and quantum machine learning, for real-time predictive analytics. They leverage hyperspectral imaging for monitoring soil health and citizen science-generated high-frequency diet and market systems data for monitoring the hidden layers of food systems in real-time, while exploring digital twins for informing complex decisions across FLW systems. AoW4 Enabling Environment spurs innovative use of digital frontier technology through the Network of Innovation Hubs while ensuring ethical technology use and inclusive data governance.

3. Use case-based prioritization

Digital Transformation's use case-based approach aims to address key demands from Programs and ensure that innovations result in tangible outcomes that accelerate research and impact. By focusing on use cases that align with the 2030 outcomes of the Digital Transformation theory of change, the use case-based approach ensures that innovation is feasible, demand-driven, iterative with final users, and designed to make significant impacts. The following methodology will guide the implementation of use cases within this framework.

3.1 Use case methodology and approach

Stakeholders include CGIAR and partner researchers, research program managers, data scientists, local innovators, private tech companies, end-users of the research outcomes, and funders. Engagement has begun with a structured consultation process to understand the critical data and digital needs as well as interests and capabilities of these stakeholders. These consultations will continue to occur regularly, adapting to evolving priorities to ensure that Digital Transformation responds to shifting challenges.

The selection process will prioritize use cases that demonstrate demand across multiple Programs and Centers. By focusing on cross-Program demand, Digital Transformation ensures that the chosen use cases address larger, systemic challenges that go beyond the scope of individual projects. This approach fosters collaboration between Programs, leveraging diverse

expertise and resources, and drives collective innovation. Such alignment also enhances the potential for these cases to be scaled effectively across CGIAR's broader network, contributing to impactful, system-wide transformation.

To ensure a more human-centered approach, the Accelerator will conduct targeted meetings with relevant taskforces in each Program and Center. Rather than relying solely on an open call for proposals, these engagements will help us better understand specific needs and guide stakeholders in defining what constitutes a strong use case. By facilitating these discussions, we can identify opportunities for collaboration, where similar needs or shared resources across Programs can lead to integrated use cases. This proactive approach will not only align proposals more closely with the real challenges faced by each Program but also encourage the pooling of existing progress, resources, and innovations to create more impactful, scalable solutions.

Once the use cases have been identified, they will be assessed using the following criteria to determine their priority and assess their alignment with the Accelerator's goals and CGIAR's broader mission.

- *Adherence to CGIAR principles and mission*: Use cases should include implementation of FAIR (Findable, Accessible, Interoperable and Reusable), GESI, HCD and ethical principles, assessed using agreed indicators. Use cases should contribute to "advancing FLW systems' transformation in a climate crisis".
- *Alignment with the Accelerator's theory of change (TOC)*: Use cases must be linked to the outcomes outlined in the theory of change, ensuring they contribute to the intermediate and 2030 goals. This means either leveraging AI-ready data to enhance innovations, inform policy, accelerate research, or enhance digital services through responsible innovation procedures.
- *Potential for impact*: The potential of the use case to significantly accelerate progress towards Program and Accelerator goals. This includes enhancing Program efficiency and effectiveness, more rapidly delivering measurable outcomes such as increased productivity, faster achievement of Program objectives, and enhanced decision-making processes, all contributing to the broader strategic impact.
- *Cross-Center and cross-domain collaboration*: Use cases integrating similar demands across Centers and Programs, ideally addressing foundational and systemic issues, will be prioritized. By addressing shared challenges through a unified approach, the Accelerator avoids duplication, enabling a broader, system-wide response to key challenges.
- *Data and digital ecosystem integration*: Use cases must contribute to building or strengthening a robust digital ecosystem through responsible data governance, the use of open-source tools, and enhancing interoperability. They should also support the adoption of FAIR principles and contribute to communities of practice and capabilities both within and outside CGIAR, particularly around datasets, analytics, and decision support tools.
- *Maturity and scalability level*: Use cases will be evaluated based on both their level of development and their potential for scaling. Maturity refers to how well defined the problem is, the readiness of the solution and partnerships or resources for implementation. Scalable use cases will showcase the ability to expand beyond pilot phases, either by leveraging existing resources or by adapting successfully across

different regions, Programs, or user groups. The Accelerator will balance the portfolio in terms of its risk appetite, building on existing work (especially the CGIAR Initiative on Digital Innovation) and initiating new use cases.
- *Partnerships for collaboration, adoption and scaling*: A successful use case will stimulate work across Programs and foster cross-domain and cross-Center collaboration. It will prioritize strong demand and scaling partners identified *a priori*, to ensure that solutions are demand driven and can be rapidly scaled, based on clarity of the needs and capabilities of target audiences.

Prioritized use cases will provide a roadmap to define a balanced portfolio comprising:

- *Short-term initiatives*: High-priority use cases that are easy to implement and can deliver quick wins.
- *Medium-term projects*: Use cases that require more resources and time but offer substantial benefits.
- *Long-term goals*: Ambitious use cases that align with the Accelerator's strategic vision but may require significant investment and effort.

The Accelerator will validate priority use cases with stakeholders to ensure broad support, clarify roles and responsibilities, address concerns and allow for iterative refinement.

Prioritized use cases will be collaboratively implemented, with regular monitoring and evaluation to track progress, measure impact, and make adjustments as needed. This includes continuing work initiated under the previous Initiative on Digital Innovation by advancing use cases in carefully planned batches. Incipient work requiring further development will involve collaborations with AoW1 Data Ecosystem for data needs and AoW3 Digital Futures to build on early-stage ideas. Mature work will be finalized in AoW1 Data Ecosystem and AoW2 Action Lab, ensuring it is ready for field testing/application. Validated solutions will connect with Scaling for Impact to facilitate broader implementation and impact. This iterative process ensures continuous alignment with the evolving goals of the Accelerator and other use-case stakeholders.

3.2 Preliminary ideas of use cases

Stakeholder consultations have identified a strong demand for inclusive digital tools and data systems along with a growing readiness to ensure ethical use of AI and emerging technologies to improve productivity, profitability, and climate resilience. These foundational elements are crucial for CGIAR's digital transformation, as they enable more efficient and transparent data sharing, streamline research processes, and empower diverse user groups for accelerated knowledge and innovation outcomes.

The following are examples of possible use cases based on current demand, which will be assessed during the Inception Phase:

- Large Language Model finetuned with CGIAR research publications (and subsequently, CGIAR datasets) to rapidly develop inclusive climate-related interventions for testing and validation across FLW systems, in collaboration with Climate Action.
- Large Language Model (LLM) connected to genebank databases for smooth user interaction to request accessions and receive feedback, anticipating expansion of this solution to provide (e.g., suitability of new improved varieties, seed sources, advice on cropping systems, potential for developing market chains).

- Leveraging agronomic and crop breeding data to realize genetic and agronomic gains for climate adaptation and mitigation by diverse stakeholders. This will be a 3-way cooperation between Breeding for Tomorrow, Sustainable Farming, and Digital Transformation.
- Addressing youth empowerment in citizen science across Programs. This includes leveraging the UNICEF-YOMA (Youth marketplace) platform's reach, mobilizing youth as citizen scientists addressing data sparsity, and providing educational and upskilling opportunities for the youth, contributing to their employability and personal growth.
- Using citizen science to facilitate sustainable farming. It involves collaboration between Sustainable Farming, Multifunctional Landscapes, and Digital Transformation to develop pest and disease early warning systems and interventions, and/or explore if input quality can be verified by simple and cheap tests backed by farmer reporting, on-farm experimentation with diverse practices.
- Market and diet monitoring with citizen science approaches in collaboration with Better Diets and Nutrition.
- Enhancing food production monitoring and natural resources management through satellite remote sensing data in collaboration with Policy Innovations.
- Assuring a “data-first” culture that employs best practices in data management to understand and predict site-specific environmental and social variability in use cases across Programs and Digital Transformation, benefitting from a data-to-analytics ecosystem with efficient computing and analytical pipelines.

4. Comparative Advantage

4.1 Summary of high-level outputs

The Digital Transformation Accelerator aims to create a comprehensive ecosystem for data-driven innovation in agriculture. It will develop standardized, open, and FAIR datasets from diverse sources across CGIAR and partners, alongside co-designed data standards and tools. The Accelerator will drive demand-driven frontier technology pilots and responsible digital solutions, supported by toolkits and trainings for generating, using, and governing FAIR data, AI, and digital solutions inclusively and ethically. It will establish a global network of strategic partners for knowledge exchange and provide trainings on digital product sustainability and business models. To ensure widespread adoption and responsible use, the Accelerator will implement incentives for FAIR and AI-ready data, develop policy guidelines and governance frameworks for best practices, and conduct policy consultations. This holistic approach will foster a culture of responsible innovation and data-driven decision-making in agricultural research and development.

4.2 Needed sources of comparative advantage

Substantial sources are needed, including: i) *Incentives:* institutional support, long-term investment, and commitment to best practices for a data-first culture that values FAIR and AI-ready assets, and helps develop a validated, inclusive digital portfolio; ii) *Human capital:* technical talent hiring and retention for data science-, AI-, software-engineering, and data-management expertise, with familiarity of FLW systems context and research; iii) *Human and social capital:* access to deep domain knowledge about agrifood system actors’ typologies and production systems, ensuring that digital innovations are inclusively and sustainably tailored to

local contexts and needs; iv) *Biophysical capital:* an efficient and sustainable digital infrastructure for research, including high-performance computing, data storage, and reliable network connectivity; v) *Social capital:* partnerships and innovation networks, backed by resources for scaling and impact, including collaborations with tech companies, governments, and local organizations to ensure widespread adoption and sustainable implementation of digital solutions; vi) *Social capital:* access to diverse datasets from across CGIAR and partners, and the legal and ethical frameworks to manage this data responsibly according to FAIR principles; and vii) ongoing capacity-building resources, including trainers, curriculum developers, and learning platforms, to enable CGIAR staff, partners, and beneficiaries to effectively leverage and contribute to data, digital tools and innovations while adhering to best practices.

4.3 Partners' comparative advantages

While CGIAR possesses unique AR4D strengths, partners may have comparative advantages in digital transformation:

- Technology pioneers and large tech companies have advanced expertise in emerging technologies. They possess vast proprietary datasets and technologies, which can provide unique insights and capabilities. Their financial resources allow for substantial investments in state-of-the-art digital infrastructure and sustained provision of digital services. They have experience in rapidly scaling digital solutions, and agility in adapting to fast-changing technological landscapes.
- Private-sector partners can offer competitive compensation packages to attract and retain top-tier professionals, giving them access to larger pools of specialized technical talent. They can attract private funding and develop revenue models to scale digital innovation beyond the ability of public initiatives.
- Academic and advanced research institutions (ARIs) bring multidisciplinary knowledge and talent through their students and research. They are often free to pursue cutting-edge, high-risk research that fosters innovations. Academic partners also typically have extensive experience managing large-scale research projects and interdisciplinary collaborations.
- Other non-governmental organizations (NGOs) may have extensive networks and relationships in specific regions or domains, experience in implementing digital solutions in challenging environments or working with specific underserved populations. Certain NGOs may also have funding flexibility that supports rapid solution prototyping and testing.
- Public institutions often have access to unique datasets and resources. They can influence policy to support digital innovation in agriculture and leverage established mechanisms for large-scale dissemination of information and technologies across national or regional levels.
- Local agri-techs and startups typically have good understanding of local contexts and challenges. They may be more agile in developing and adapting solutions to specific local needs and innovative business models. Their close connections to farming communities provide valuable insights and facilitate rapid testing and iteration of digital solutions.

4.4 Trade-offs between CGIAR and partners

Output	CGIAR Expertise	Partners		Trade-Offs
		Expertise	Example	
Digital Transformation Accelerator Hub	Deep understanding of agrifood systems' needs and contexts	Advanced technological capabilities and resources	Tech Pioneers	Partners may bring superior technological infrastructure; CGIAR's domain expertise ensures the hub addresses critical agricultural challenges.
FAIR Data Tools and Standards	Extensive experience with readily actionable FAIR data tools, standards and workflows	Cutting-edge data science expertise	ARIs	Partners support sophisticated tool development and transfer lessons from biomedical research; CGIAR is better equipped to create/apply AR4D standards relevant for FLW systems.
Data Assets and Collections	Unique, extensive, global agricultural datasets	Advanced data processing capabilities and additional data sources	Satellite Companies, Tech Firms	Partners offer advanced integration techniques and analytical workflows; CGIAR's datasets and contextual understanding are invaluable.
Capacity Building for Digital Agriculture	Deep knowledge of capacity needs in agricultural research and development	Experience in developing and scaling digital learning platforms	Tech Companies	Partners have advanced training delivery systems; CGIAR's understanding of partners' capacity gaps provides edge in content development.
Digital Ethics and Inclusion Training Materials	Experience with ethical challenges in agricultural research and development	Broad expertise in digital ethics and inclusion across development sector	NGOs, Universities	Partners have comprehensive knowledge of digital ethics; CGIAR's practical experience in FLW contexts is crucial for developing relevant materials.
Digital Core Infrastructure	Understanding AR4D infrastructure needs	More advanced, scalable technological infrastructure	Cloud Service Providers	Partners can provide more robust infrastructure; CGIAR is better positioned to tailor it to unique AR4D needs.

Output	CGIAR Expertise	Partners		Trade-Offs
		Expertise	Example	
CGIAR-wide Data Governance	Intimate knowledge of CGIAR's organizational structure and data landscape	Diverse experience in implementing data governance frameworks across public sector	Consulting Firms	Partners have broad experience; CGIAR's internal knowledge is critical for developing governance aligned with its specific needs and culture.
Strategic Digital Partnerships	Established trusted agricultural-sector relationships	Wide technology sector networks	Tech Companies, Startups	Partners bring diverse technological collaborations; CGIAR's networks are essential for building trust in validating/deploying digital solutions.
Global Digital Agriculture Convenings	Convening power in agricultural research communities and recent experience hosting ICTforAg	Potentially broad reach across various sectors	International Organizations	Partners can attract a diverse audience; CGIAR's credibility in AR4D empowers it to lead meaningful discussions on digital agriculture.

5. Accelerator-level theory of change

The Digital Transformation Accelerator will support CGIAR Programs and partners in harnessing the power of digital technologies to address CGIAR's five Impact Areas: Nutrition, Health and Food Security; Poverty Reduction, Livelihoods, and Jobs; Gender Equality, Youth, and Social Inclusion; Environmental Health and Biodiversity; and Climate Adaptation and Mitigation. The Accelerator will work along all three core impact pathways of CGIAR's Theory of Change - *Innovation*, *Capacity* and *Policy*- through four interconnected AoWs: AoW1 Data Ecosystem, AoW2 Action Lab, AoW3 Digital Futures, and AoW4 Enabling Environment.

On *Innovation*, the Accelerator will address the CGIAR-level key output *"Digital innovations and platforms and harnessing AI for decision makers"* by supporting Program use cases (AoW2 Action Lab), facilitating future-oriented scoping of digital solutions (AoW3 Digital Futures), providing scientific and infrastructural capabilities related to AI (AoW4 Enabling Environment), and supporting capabilities for the high-quality, AI-ready data critical for such technologies (AoW1 Data Ecosystem). The acceleration of Program outcomes towards CGIAR goals through digital solutions and AI-read data is one of the main outcomes in this TOC. The Accelerator-level outcome of "Closing data and analytics gaps" will follow from the use of these tools and capabilities. Together, this should position CGIAR as a constructive thought leader in shaping the digital research agenda, as an additional Accelerator outcome of this core impact pathway.

On *Capacity*, the Accelerator will support the CGIAR key output *"Creation of tools, methods, datasets, and metrics to develop innovations and measure progress"*, by supporting FAIR data management capacities that underpin this ability (AoW1 Data Ecosystem). A second CGIAR key output addressed under *Capacity* is *"Capacity sharing on contextualizing integrated farm and landscape management options and enabling policies and institutional innovations"*. The Accelerator will support Programs on use cases that deliver integrated management options (AoW2 Action Lab) and institutional innovations that require new institutional arrangements and business models to manage data as a key resource (AoW4 Enabling Environment). The Accelerator will specifically build the capacity of scientists and data managers, but also institutional decision-makers to achieve these goals, towards the Accelerator's TOC outcome: "CGIAR and partners responsibly use data, AI and other digital tools". This also aligns with the broader CGIAR outcome of "Enhanced capacity of FLW system actors, platforms, and networks to develop and use tools, evidence, and integrated innovations".

Under the *Policy* impact pathway, the Accelerator will address *"Policy and governance recommendations for improved food, land and water systems"*, by working on the chain from properly organized, open data to data-driven decisions in FLW systems. This will require that different data types coalesce into synthesis products to address systems complexity in rapid, iterative cycles that feed back to decision-makers (AoW1 Data Ecosystem and AoW2 Action Lab). This will contribute to the CGIAR Policy outcome *"Improved institutions for implementation of policies"*, allowing for agile responses to FLW challenges (covered under other CGIAR Policy outcomes), which corresponds to the Accelerator's outcome "Decision-makers use evidence-based insights to address trade-offs and systems dynamics".

To achieve these outputs and outcomes, the Accelerator works through interconnected Areas of Work:

- AoW1 Data Ecosystem.

- AoW2 Action Lab.
- AoW3 Digital Futures.
- AoW4 Enabling Environment.

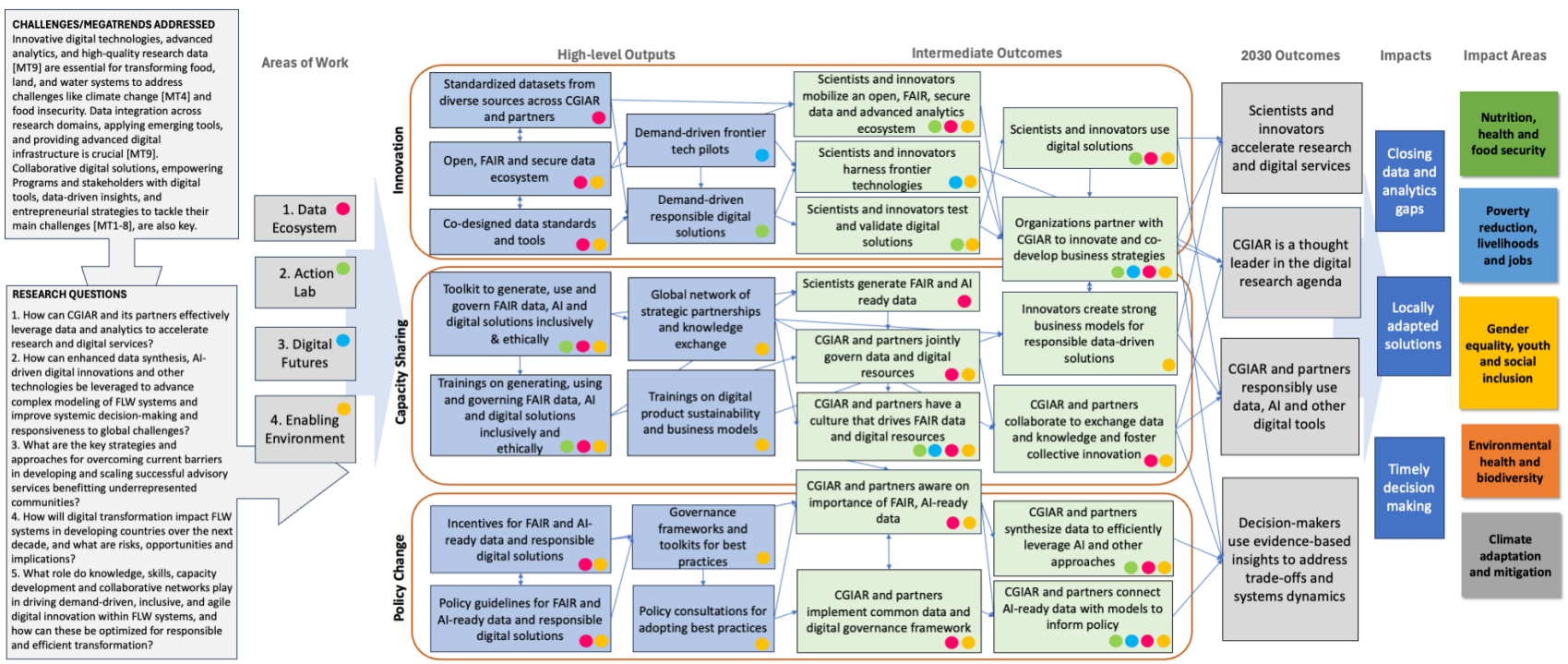
AoW1 Data Ecosystem prioritizes the creation and testing of a robust, AI-ready data infrastructure with high-performance cloud-based computing capabilities. This encompasses the standardization of datasets, quality assurance processes, and the development of tools for generating, sharing and using FAIR data. AoW2 Action Lab delivers actionable insights through demand-driven digital solutions, enabling scientists and innovators to test, validate a use these tools to accelerate innovation and decision-making. AoW3 Digital Futures emphasizes equipping scientists and innovators to harness frontier technologies through demand-driven pilots, positioning CGIAR as a leader in the digital research and FLW data agenda. To support these technical areas, AoW4 Enabling Environment emphasizes a digital core with foundational infrastructure, developing governance frameworks, policy guidelines, capacity development and a data-centric culture within CGIAR and across its partners. This will ensure that digital technologies are used responsibly and ethically, and that decision-making is informed by data.

The research agenda of Accelerator is guided by how CGIAR and its partners can efficiently leverage data, analytics, AI and other frontier technologies to accelerate research and digital services. Specifically, it will explore how CGIAR and its partners can enhance data synthesis and AI-driven digital innovations as crucial elements for advancing complex modeling of FLW systems. The impact of digital transformation on FLW systems in developing countries over the next decade will also be a key focus, especially considering potential socioeconomic and environmental implications. Overcoming barriers in developing and scaling successful advisory services among underrepresented communities is another critical area of study. Additionally, the role of knowledge, skills, capacity development, and collaborative networks in demand-driven, inclusive, and agile digital innovation within FLW systems will be examined, with emphasis on optimizing these elements for responsible and efficient transformation.

The key expected outputs of this Accelerator include enhanced data interoperability and AI-ready datasets, as a foundation for addressing CGIAR's five Impact Areas more effectively. Additionally, we will ensure that digital technologies are developed and deployed in ways that benefit all stakeholders, including marginalized communities. This aligns with the goal of bridging the digital divide, ensuring that everyone can benefit from technological advancements, and directly relates to the CGIAR Impact Area on *Gender, Equality, Youth and Social Inclusion*.

By assuring access to high-quality data and digital tools, the Accelerator will enable researchers, policymakers and other agricultural practitioners to conduct research and make informed, pertinent decisions accurately and efficiently. Additionally, we will contribute to the development of open-source digital tools and resources for use by researchers and practitioners around the world, resulting in co-investment for further digital development and wider use.

The concept of responsible digital innovation embedded throughout the four AoWs, and anticipated as both an intermediate and 2030 outcome, requires that digital innovations be designed and implemented in ways that actively promote gender equality and social inclusion. Further, all innovations and frameworks designed under this Accelerator must adhere to FAIR, ethical and equity principles to ensure they do not widen existing inequalities or compromise on users' rights to privacy and data use.



*This ToC assumes collaboration with other programs to support their digital needs, achieving goals in food security, climate change adaptation, poverty reduction, and other Impact Areas more efficiently. Starting in 2025, the first stage will identify use cases and cross-CGIAR products to serve CGIAR and partners' needs.

Figure 1: Accelerator-level ToC visual

Table 1: Digital Transformation Accelerator ToC table

Statement	AoW	CGIAR	External partners				Assumptions (for outcomes only)	Indicator and target (for 2030 outcomes only)
			NARES	ARIs	Private sector	Governments		
Standardized datasets from diverse sources across CGIAR and partners	1							
Open, FAIR and secure data ecosystem	1,4							
Co-designed data standards and tools	1,4							
Demand-driven frontier tech pilots	3				Tech companies, local innovators			
Demand-driven responsible digital solutions	2				Tech companies, local innovators			
Scientists and innovators mobilize an open, FAIR, secure data and advanced analytics ecosystem	1,2,4				Tech companies, local innovators		Stakeholders are willing and able to adopt FAIR principles. Adequate investment and capacity to develop and sustain an open and secure data ecosystem.	
Scientists and innovators harness frontier technologies	3,4				Tech companies,		Frontier technologies aligned with the existing research goals and	

					local innovators		appropriate for solving identified challenges.	
Scientists and innovators test and validate digital solutions	2,4				Local innovators		Regulatory and ethical frameworks to support the testing of digital solutions.	
Scientists and innovators use digital solutions	1,2,4				Local innovators		Adequate infrastructure and resources (e.g., broadband connectivity, cloud services) to support use of digital solutions	
Organizations partner with CGIAR to innovate and co-develop business strategies	1,2,3,4				Tech companies, local innovators		Alignment between the goals of CGIAR and its partner organizations regarding innovation and business strategy development.	
Toolkit to generate, use and govern FAIR data, AI and digital solutions inclusively & ethically	1,2,4							
Trainings on generating, using and governing FAIR data, AI and digital solutions inclusively & ethically	1,2,4							
Trainings on digital product sustainability and business models	4				Local Innovators			
Global network of strategic partnerships and knowledge exchange	4				Tech companies, local innovators			
Scientists generate FAIR and AI ready data	1						Infrastructure (e.g., databases, cloud storage, computing power)	

							supports scalability and complexity of AI-ready data.	
CGIAR and partners jointly govern data and digital resources	1,4						Partners share a common understanding of the value of collaborative data governance and contribute resources (financial, technical, human) to maintain the governance structure.	
Innovators create strong business models for responsible data-driven solutions	4				Tech companies, local innovators		Innovators balance profitability with responsible data use, ensuring that business models consider data ownership, consent, privacy, and equity.	
CGIAR and partners collaborate to exchange data and knowledge and foster collective innovation	1,4				Tech companies, local innovators		Clarity regarding data ownership, usage rights, and intellectual property among all collaborating parties.	
Incentives for FAIR and AI-ready data and responsible digital solutions	1,4							
Policy guidelines for FAIR and AI-ready data and responsible digital solutions	1,4							
Governance frameworks and toolkits for best practices	4							
Policy consultations for adopting best practices	4							
CGIAR and partners aware on importance	1,4						Key stakeholders understand that FAIR, AI-ready data is essential for	

of FAIR, AI-ready data							maximizing the value of research and innovation.	
CGIAR and partners implement common data and digital governance framework	1,4						Partners agree on a unified governance framework for ethical, legal, and secure management of data and digital resources.	
CGIAR and partners synthesize data to efficiently leverage AI and other approaches	1,2,4						Data is interoperable and structured in a way that allows effective integration into AI and other analytical tools.	Data from at least 5 major projects or datasets can be integrated into AI-ready formats, enabling efficient analysis and model development.
CGIAR and partners connect AI-ready data with models to inform policy	3,4						AI-ready data is trusted by policymakers and seamlessly integrated into decision-making models.	Data from at least 3 policy-relevant studies synthesized and applied by AI models to generate actionable insights for decision-makers.
Scientists and innovators accelerate research and digital services	1,2,3,4						Alignment between scientists' innovations, regulatory frameworks, and market demand ensures that research outcomes are quickly adopted and scaled as digital solutions.	At least 5 new digital services implemented across Programs and partners.
CGIAR is a thought leader in the digital research agenda	2,3,4						CGIAR maintains strong partnerships globally, enabling it to influence and guide the direction of digital research.	At least 6 major thought leadership articles or white papers published on digital research and innovation.
CGIAR and partners responsibly use data, AI and other digital tools	1,2,3,4				Tech companies, local innovators		Ethical guidelines are consistently followed to ensure data privacy, security, and fairness in AI and digital technologies.	At least 6 Programs implement FAIR data principles and responsibly use AI. At least 3 collaborative initiatives on ethical and responsible use of AI with global partners.
Decision-makers use evidence-based insights to address trade-offs and systems dynamics	1,2,3,4				Local innovators		Decision-makers are capable and willing to integrate scientific evidence and system modeling into policy and strategy development processes.	At least 3 case studies published demonstrating how evidence-based insights have influenced policy at national or subregional levels.

6. Areas of Work

Multiple evaluations and syntheses over past CGIAR portfolios offer lessons on the applications, potential and shortcomings of digital and data strategies in agriculture, shaping Digital Transformation's AoWs. The IAES emphasized recommendations from the Big Data Platform, directly linking science quality to advancing digital strategies. One recommendation called for CGIAR to "Prioritize and advance the interoperability agenda, building on CGIAR's wide variety of datasets" (reflected in AoW1 Data Ecosystem). This was reinforced by a System Board-endorsed response, which stressed the importance of unified digital governance to support CGIAR's overarching strategy (AoW4 Enabling Environment).

Further, a 2021 synthesis of 43 evaluations from the CGIAR Research Program (CRP) era underscored the vast potential of digital innovation and big data. This synthesis recommended a comprehensive review of CGIAR's big data capacities and their practical applications for pro-poor sustainable development. Key suggestions included expanding the use of remote sensing and geographical information systems, exploring ethical applications of AI and big data, drawing lessons from current (AoW2 Action Lab) and emerging (AoW3 Digital Futures) technologies.

6.1 Data ecosystem

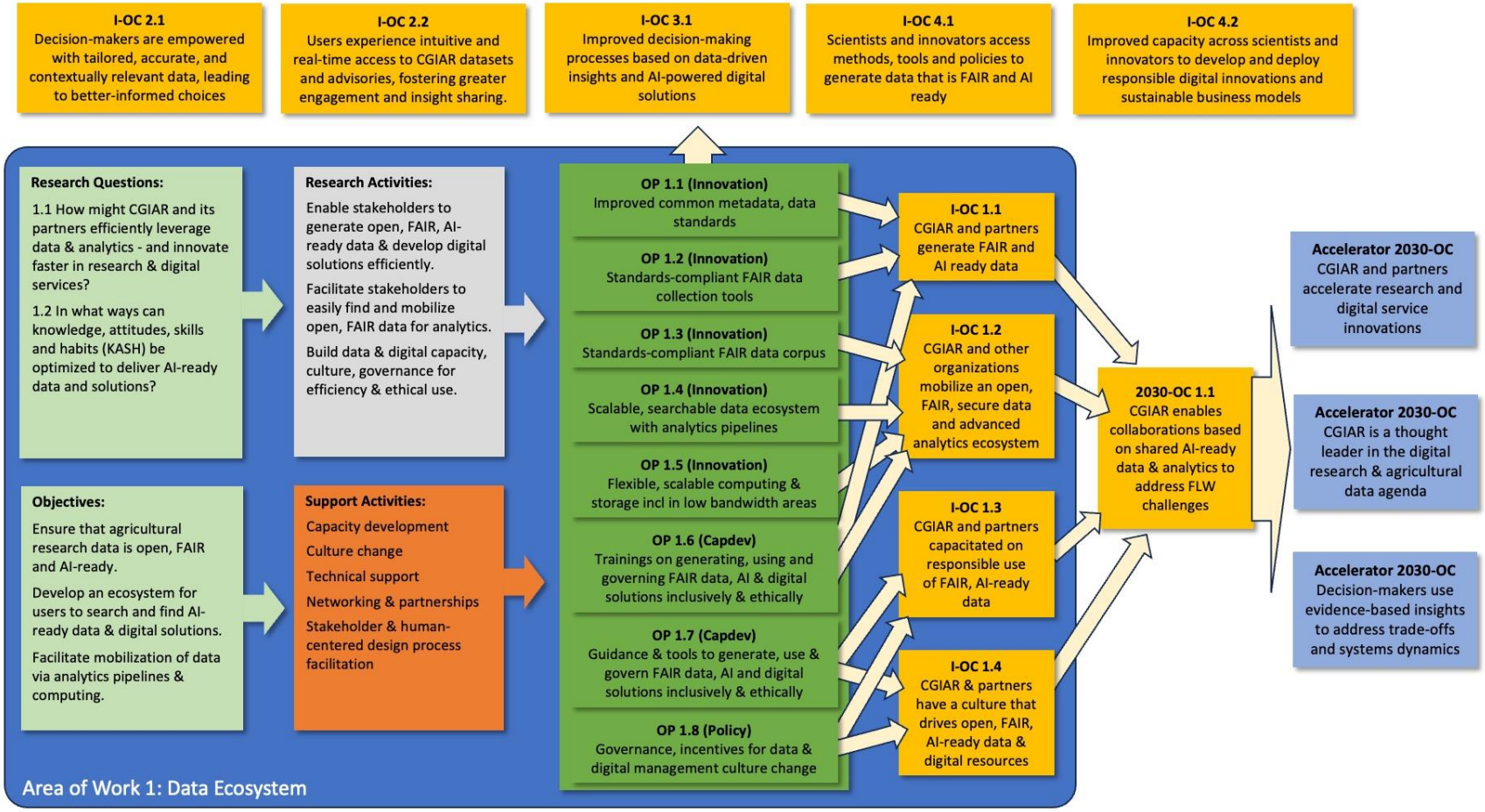


Figure 2: AoW1 ToC visual

Overall ambition

Machine learning and other AI and predictive approaches are increasingly used in agricultural research to capture effects of site-specific environmental and social variability and interactions on outcomes of interest. These promising models and newly developing AI approaches depend on large quantities of data that are often difficult to find and use. Often, databases can only be created by aggregating primary data from individual experiments and surveys. Doing this effectively necessitates a large corpus of shared FAIR, AI-ready AR4D data and analytics capabilities backed by good governance to accelerate innovation (2030-OC1.1).

CGIAR has been a global AR4D leader for decades, amassing valuable, potentially transformative data. While CGIAR has more recently led efforts on open and FAIR data, these assets must be more widely shared, and data treated as a core CGIAR asset and resourced or incentivized accordingly. Interoperability and re-use remain bottlenecks because data and metadata are often incomplete; heterogenous; and lack standard variable names and defined vocabularies for values. Increasing amounts of large spatial, image and phenotyping and genotyping datasets generated by CGIAR and its partners need to be consistently managed and easier to leverage. AoW1 Data Ecosystem will tackle these issues, ensuring scientists and partners can access powerful analytical and computing capabilities.

Research questions and justification

1.1. How might CGIAR and partners efficiently leverage data & analytics - and innovate faster in research and digital services?

Accelerating data-driven research and innovation to address FLW systems challenges requires consistently managing and sharing data through an ecosystem approach drawing on Center databases, repositories and capabilities. Key Center capacities that will be enhanced through this ecosystem include: improved, well-maintained metadata and data standards (OP1.1) and flexible tools and approaches to collect data (OP1.2) or harmonize legacy data based on these standards (1.3). OP1.1 and 1.2 will help CGIAR and partners generate FAIR and AI-ready data (I-OC1.1). Efforts on socioeconomic data will be intensified to maximize impact of GESI research.

Standardized data must be easy to find, aggregate and download for analysis – necessitating a scalable, searchable, secure data ecosystem drawing on resources across Centers, partners, and domains (OP1.4). Workflows that convert aggregated data into model-ready formats reduce the time required to interpret, process and format data for analysis. Flexible, scalable computing and storage that performs well in low bandwidth areas enables reliable, efficient analysis and development of digital solutions (OP1.5). OPs 1.3, 1.4, and 1.5 help mobilize open, FAIR, and AI-ready data through a secure data and advanced analytics system (I-OC1.2).

1.2. In what ways can knowledge, attitudes, skills and habits be optimized to deliver AI-ready data and solutions?

The Accelerator's strategy hinges on building a strong data and digital culture to change attitudes and habits. Training, advocacy, and guidance will enable CGIAR researchers and partners to generate, use and govern FAIR data and digital solutions inclusively and ethically (OP1.6 and 1.7). OP1.6 will contribute to generating FAIR and AI ready data (I-OC1.1) while OP1.7 will help capacitate CGIAR and partners on its responsible use (I-OC1.3). It will also contribute towards a culture that drives open, FAIR data and digital resources (I-OC1.4). AoW1

Data Ecosystem will work with AoW4 Enabling Environment to build governance around managing and using data and analytics, and advocate for incentives to deliver on aspirations (OP1.8). This will facilitate strong capacity on responsible data use (I-OC1.3) and prioritize an inclusive and ethical data and digital culture (I-OC1.4).

Generating open, AI-ready, multi-dimensional data/data products (e.g., GESI) and their rapid mobilization for advanced analytics (I-OC1.1 and 1.2) will help CGIAR close data & analytics gaps for diverse stakeholders. Mobilizing data for analyses (I-OC1.2), backed by capacity on its responsible use (I-OC1.3), FAIR, AI-ready data and digital resources (I-OC1.4) will help CGIAR and partners rapidly and effectively use data to accelerate innovation (2030-OC1.1). Lastly, AoW1 Data Ecosystem will empower decision-makers to make better-informed choices and innovate faster (I-OC2.1), through real-time access to datasets and advisories, fostering engagement and insight sharing (I-OC2.2) and AI-powered digital solutions (I-OC3.1). A common data and digital governance framework (I-OC4.1) and capacitation will assure responsible data use and digital innovations (I-OC4.2).

CGIAR is well-positioned to lead the development of a data-to-analytics ecosystem to enable digital transformation, with several comparative advantages: It has developed i) standards, tools and awareness on standardized data collection; ii) approaches to standardize existing datasets; iii) enabled scalable search and download of data aggregated into databases; iv) conceived analytical pipelines that ready aggregated data for machine learning and other models; and v) created validated digital solutions and services. Additionally, CGIAR offers huge amounts of multi-disciplinary agricultural data, possesses growing agricultural data science expertise, and leverages strong, trusted partnerships and global reach towards actionable impact.

High-level activities and outputs

This work is guided by stakeholder consultations, alignment of CGIAR Center needs and funder priorities. It is informed by learnings from the Big Data Platform, the Initiatives on Digital Innovation, Excellence in Agronomy, and Breeding Resources, and other bilaterally supported digital research and development activities across Centers (e.g., 1000Farms, Rural Household Multi-Indicator Survey (RHoMIS)). Work is anticipated throughout the data lifecycle: standards maintenance, mapping, and development; standards-compliant data collection; standardization of existing data; and enabling data discovery across CGIAR Centers and partners. Anticipated high-level activities and outputs are outlined below.

Activity 1.1. Enable stakeholders to generate open, FAIR, AI-ready data & develop digital solutions efficiently. [OP1.1, 1.2, 1.3, I-OC AL1.1, I-OC DF1.1]

Assuring standards maintenance, mapping, and development.
Getting beyond individual or institutional standards to community/industry standards for metadata schemas and annotation and data variables, formats and value choices is critical for generating FAIR and AI-ready data. Activity 1.1 encompasses established and new work to (a) enhance existing, relevant, and machine-readable standards (e.g., ontologies), (b) map across existing standards, and (c) contribute to developing standards where necessary (e.g., fishery, livestock-related research).

Enabling collection of interoperable data and metadata.
This activity will develop and deploy data collection methods, producing interoperable data from field trials and surveys. Existing tools (e.g., AgroFIMS, DataScribe, ClimMob) for collecting well-described trials data and reusing standardized surveys will be refined for new needs (e.g.,

GESI). Anticipated work will ensure (a) user-friendliness, (b) ability to collect data using open-source tools, (c) flexibility in specifying trial design and treatments, (d) shared scripts for data-driven analysis/decision support, (e) increased use, through advocacy and training, (f) guidance on formats and standards to help data collectors build/use preferred tools, and (g) training for data managers to standardize metadata and publish data assets to repositories through consistent workflows.

Making existing data interoperable.
Preparing agricultural data for analytical workflows is time-consuming and datasets are often inefficiently processed multiple times by different researchers. The Carob approach is a community project to standardize individual datasets using the standards described above. It focuses on agronomy and breeding data but will be extended to any data relevant to CGIAR and partners.
We will improve Carob by (a) enhancing quality-control mechanisms; (b) aligning with community standards; (c) expanding participation and contributions through advocacy, training and learning resources; and (d) supporting data curators from Centers and partner institutions to curate priority datasets.

Activity 1.2. Facilitate stakeholders to easily find and mobilize open, FAIR data for analytics. [OP1.4, 1.5, I-OC AL1.2, I-OC EE1.1]
Work on components of a data-to-analytics ecosystem is ongoing, including tooling to collect and render data and metadata FAIR and the GARDIAN portal, enabling federated metadata searching over Center and partner repositories. Existing databases (e.g., a proof-of-concept Data Lake enabling search, download and aggregation of agronomy and breeding data across CGIAR), need to be further developed and include new FLW disciplinary data. This activity will deliver an MVP for a federated data-to-analytics ecosystem ("AgPile") co-designed with Centers and partner stakeholders and use cases (e.g., breeding and digital phenotyping) to assure key functions, including (a) federated search of small and large data and models across existing data sources in Centers, (b) harmonized data, feeding dashboards and analytical workflows (e.g., machine learning, crop/climate modeling, workbench); (c) leveraging AI over high-quality data assets; (d) access to shared algorithms and data management tools.

Activity 1.3. Build data & digital capacity, culture, governance for efficiency & ethical use. [OP1.6, 1.7, 1.8, I-OC EE1.2]
Most organizations prioritize technical skills. However, valuing and enabling open, interoperable data requires changing attitudes and habits. Data management is often an afterthought, and this will be addressed through new efforts proposed here and in AoW4 Enabling Environment. CGIAR must move to a data-first culture, with each Center instituting a high-level role to assure FAIR, open data from collection to sharing. We will support this through: (a) advocacy, training and self-learning materials; (b) incentivization (working with CGIAR leadership and key funders); (c) value demonstrations that use standardized data; and (d) tools and approaches for data standardization.

Assumptions

These activities address data and analytics needs expressed across current CGIAR Initiatives, multi-disciplinary Center groups, and external stakeholder consultations. Assumptions to reach anticipated outcomes: (i) Frequent user testing and HCD is employed in developing the data ecosystem; (ii) Scientists and data collectors move from business-as-usual to standards-based approaches; (iii) Open, FAIR, AI-ready data is reused for high-value outputs to demonstrate

value; (iv) CGIAR and partners champion and incentivize recommended approaches; (v) Current and future funding is sufficient to develop an ecosystem that can be sustained as a core CGIAR asset.

Interactions with Areas of Work and other Programs

All activities and outputs will advance other AoWs envisioned for Digital Transformation and are critical -but hitherto missing or siloed- determinants of success for research and data-driven innovation. An enhanced data ecosystem is a foundational requirement to achieve FLW systems transformation through data and analytical workflows that power digital solutions and insights via AoW2 Action Lab and to test emerging technologies via AoW3 Digital Futures. It is relevant across bilateral projects and Programs, but early collaboration through in-development use cases in enhancing domain specific data is expected with Sustainable Farming (agronomic data), Breeding for Tomorrow (breeding trial data), Climate Action (climate data), and Policy Innovations (statistics data).

Table 2: AoW1 ToC table

(dark blue = initial work; light blue = work through 2030)

ToC Element #	Statement	Programs	Accelerators		Genebanks	External partners					Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only
			Capacity Sharing	Gender Equality		ARIs	NARES	Governments	Private sector	Public sector		
OP1.1	Improved common metadata, data standards											
OP1.2	Standards-compliant FAIR data collection tools											
OP1.3	Standards-compliant FAIR data corpus											
OP1.4	Scalable, searchable data ecosystem with analytics pipelines											
OP1.5	Flexible, scalable computing & storage incl in low bandwidth areas											
OP1.6	Trainings on generating, using and governing FAIR data, AI & digital solutions inclusively & ethically											
OP1.7	Guidance & tools to generate, use & govern FAIR data, AI and digital solutions inclusively & ethically											

OP1.8	Governance, incentives for data & digital management culture change											
I-OC1.1	CGIAR and partners generate FAIR and AI ready data										Scientists and data collectors move from business as usual to standards-based, user-friendly approaches	
I-OC1.2	CGIAR and other organizations mobilize an open, FAIR, secure data and advanced analytics ecosystem										Open, FAIR, AI-ready data is needed and reused for high-value outputs	
I-OC1.3	CGIAR and partners capacitated on responsible use of FAIR, AI-ready data										Responsible use of FAIR and AI-ready data is deemed a priority	
I-OC1.4	CGIAR & partners have a culture that drives open, FAIR, AI-ready data & digital resources										CGIAR and partners champion and incentivize open, FAIR, AI-ready data and digital resources	
2030-OC 1.1	CGIAR enables collaborations based on shared AI-ready data & analytics to address FLW challenges										Solutions respond to demand and provide accurate, localized options AI-ready data ecosystem is user-friendly and enables faster, more localized solutions	At least 6 Programs and key partners generate and use open, FAIR, AI-ready data and shared analytics to develop research insights and innovations At least 6 CGIAR Centers generate and use open, FAIR, AI-ready data in their research efforts

6.2 Action lab

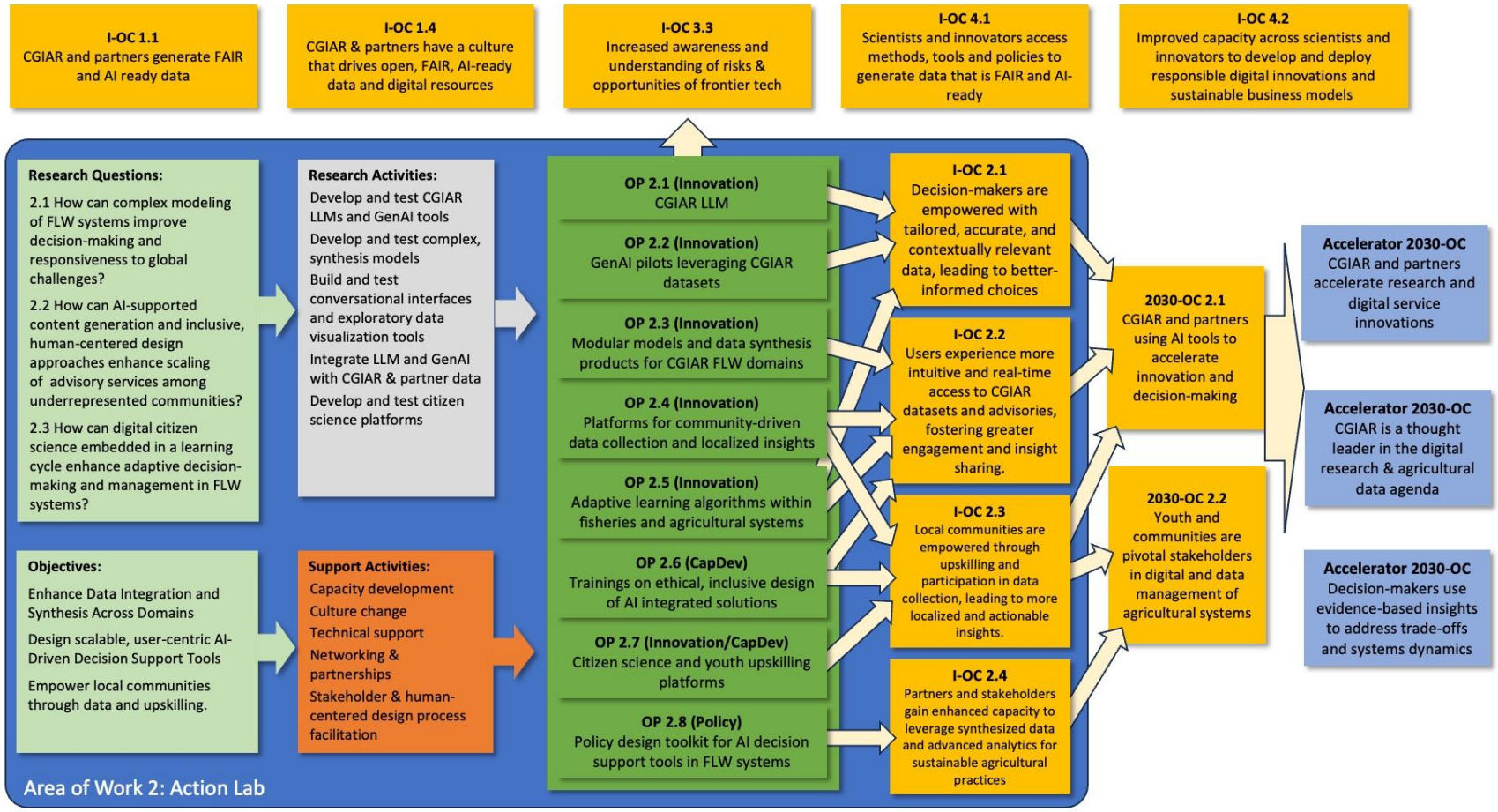


Figure 3: AoW2 ToC visual

Overall ambition

AoW2 Action Lab aims to revolutionize decision-making across FLW systems by leveraging cutting-edge digital technologies and integrative data approaches. The Action Lab ambition is to deliver actionable insights that enhance sustainability, efficiency, and resilience in agrifood and environmental systems through demand-driven digital solutions, enabling scientists and innovators to test, validate and use these tools to accelerate innovation and decision-making. By 2030, Action Lab seeks to advance systems modeling, improve AI-supported advisory services, and promote adaptive management through digital citizen science. These efforts will empower stakeholders with real-time, data-driven insights, foster collaboration, and streamline access to crucial information, thereby supporting informed decision-making on a global scale.

Research questions and justification

2.1. How can enhanced data synthesis and AI-driven digital innovations (from meta-analysis to Large Language Models, system models and digital twins) transform complex modeling of FLW systems to improve systemic decision-making and responsiveness to global challenges?
Unprecedented challenges to FLW systems render traditional research methods increasingly inadequate for providing timely, actionable information and early warning about food security and climate risks. Advanced AI and machine-learning approaches can accelerate research, better synthesize knowledge, and disseminate advisories more effectively across FLW systems, leading to more accurate predictions and better-informed decisions. AoW2 Action Lab will build on these with meta-analyses, Digital Twins, and AI-driven models to integrate and synthesize data from diverse sources. These methods enable developing dynamic, adaptive models that reflect complexities and allow timely responses to emerging challenges in FLW systems.

2.2. How can AI-supported content generation and inclusive, human-centered design approaches overcome current barriers in developing and scaling successful advisory services among underrepresented communities?
Advisory services disseminate agricultural knowledge and support decision-making, but often face scalability, user-engagement, and inclusivity challenges. Solutions often struggle to address the unique needs of marginalized groups including youth, women, and small-scale producers, leading to gaps in adoption and limited access to relevant knowledge.

CGIAR's extensive FLW expertise and data uniquely positions it to address these barriers by integrating AI-supported solutions, such as conversational interfaces, exploratory data visualization tools, and Generative AI (GenAI) within inclusive, human-centered design frameworks. Leveraging digital frontier technologies like multimodal large-language models, enable tailoring these solutions to meet the cultural and linguistic needs of diverse communities, fostering greater accessibility and usability.

AoW2 Action Lab will create and test scalable, user-friendly approaches for AI-powered advisory services to accelerate capacity building, improve decision-making, and enhance effectiveness of advisory services across agricultural contexts. It will ensure that underrepresented communities can adopt digital tools, towards inclusive, improved FLW-system productivity, profitability, and sustainability.

2.3. In what ways can digital citizen science that is embedded in a learning cycle enhance adaptive decision-making and management in FLW systems?

Digital citizen science offers a powerful means to harness the collective intelligence of communities, enabling them to generate data that directly informs adaptive, needs-responsive decision-making in FLW systems. Embedding citizen science in an iterative learning cycle not only ensures continuous improvement of data quality and relevance but also fosters community ownership, towards democratized, sustainable outcomes.

CGIAR's global reach and expertise in participatory research can provide valuable insights to influence adaptive management practices to 2030 and beyond. AoW2 Action Lab will leverage digital tools and platforms to engage a wide network of FLW citizen scientists, who could contribute localized, high-frequency data for adaptive management under dynamic environmental and socio-economic conditions. This approach will strengthen links between scientific research and on-the-ground decision-making as a vital component of CGIAR's long-term vision for addressing global challenges in agriculture and food security.

High-level activities and outputs

Activity 2.1. Accelerate the Development of Digital Innovations for Impactful Research and Informed Decisions (OP2.1, OP2.3, OP2.5, and I-OC DE2).

AoW2 Action Lab will develop cutting-edge tools and harness data and AI to accelerate scientific research, synthesize and disseminate knowledge across FLW systems, driven and informed by stakeholder priorities. Our central commitment to responsible AI practices will ensure innovations that enhance Program effectiveness and deliver tangible benefits to actors across the agri-food system.

Building on established CGIAR work in dynamic modeling, model improvement and data synthesis, this activity facilitates data synthesis to model more complex interactions and drivers of change across FLW system domains. By developing and testing both AI-driven and conventional models, AoW2 Action Lab will generate modular tools for monitoring, forecasting and scenario simulation for integration into workflows across Programs. Outputs will include improved models and synthesis products for different CGIAR domains (OP2.3) to support informed decision-making from local to global scales. One specific aim will be to support development of innovative AI-enabled advisories and training programs for farmers and natural resource managers. This activity will involve collaboration across Programs, a supportive enabling environment (AoW4 Enabling Environment), and joining forces with the Policy Innovations Program and the Capacity Sharing and Gender Equality and Inclusion Accelerators.

Activity 2.2. AI-Supported Data Interactions (OP2.1, OP2.3, and I-OC DE1)

Integrating AI and digital tools in agricultural advisory services is an emerging field, with rapidly evolving advancements. This activity will revolutionize user engagement with CGIAR data and services by demonstrating the value of structured open data and AI-driven tools. AoW2 Action Lab will analyze current decision-support systems and research methodologies, identifying key bottlenecks and areas for improvement. Employing human-centered design principles, we will engage with researchers, decision-makers, and other stakeholders to collaboratively address specific needs and challenges.

Further development of Digital Innovation Initiative's LLM-powered advisory service pilots will enable sophisticated interactions between users and data. High-level outputs will include conversational interfaces, exploratory data visualization tools, and integration with e-extension platforms for bespoke advisory services. This sub-area will also foster data accessibility and a collaborative environment for sharing insights. The activity will harness the power of AI to

enhance policy analysis, informed by qualitative socioeconomic data with a strong GESI focus. By integrating these dimensions, the AI-supported tools will not only improve data interaction but also provide richer, more nuanced insights that are crucial for developing inclusive and effective FLW sector policies.

Activity 2.3. Empowering Digital Citizen Science Innovations for Adaptive Decision-Making in FLW Systems (OP2.6, OP2.7, I-OC DE3)

This research area focuses on leveraging digital citizen science innovations to empower communities, particularly women and youth, by integrating local knowledge systems with formal data collection and analysis. The initiative aims to revolutionize the role of citizen science within communities, enabling citizens to become active contributors to decision-making in FLW systems. Digital tools will help build synergies between stakeholders, enhance communication, and foster collaborative action for development. Key outputs will include community-driven platforms based on harmonized, scalable digital solutions (building on the UNICEF-YOMA platform) and the support and integration of existing CGIAR tools such as Kaznet, Peskas, GeoAgro, ClimMob, RHoMIS, and tools built for the EnviroChamps initiative such as the mini-stream assessment scoring system (MiniSASS) app. These tools will amplify the relevance of local and traditional knowledge, supporting sustainable development through informed, adaptive decision-making.

We emphasize human-centered design, embedding citizen science within a structured learning cycle that facilitates the collection of high-quality, localized data. This approach will drive adaptive management practices, enriching CGIAR's scientific contributions while ensuring that citizens' voices resonate with decision-makers. Collaboration with AoW4 Enabling Environment will focus on community engagement and capacity building, equipping citizen scientists with skills and knowledge to produce actionable insights. A reward system will be integrated that acknowledges and celebrates citizens' contributions, fostering a sustainable model empowering contributors as central figures in shaping the future of their communities.

Activity 2.4. Accelerating digital Inclusion: Reaching Underrepresented Communities through Interoperability and Human-Centered Design (OP2.3, OP2.5, I-OC DE 2)

This activity will focus on digital development efforts to integrate existing CGIAR products and services into a more cohesive and coherent whole and improve their adoption by underrepresented communities. We will advance digital inclusiveness and accelerate uptake of digital solutions in collaboration with Programs by focusing on: (a) interoperability of digital systems (with AoW1 Data Ecosystem), (b) enhancing user experience, (c) developing and applying innovative evaluation tools (building on the Multidimensional Digital Inclusiveness Index (MDII) and in collaboration with Gender Equality and Inclusion), and building human-centered digital design capacity (building on UXtools4Ag). Use cases with Programs will help achieve this goal by enhancing existing CGIAR products and services and improving their integration and usability. We will also support new digital development to improve processes and outcomes. This activity will help deliver inclusive, interoperable and widely deployable solutions building on CGIAR science.

Assumptions

A supportive CGIAR policy and regulatory environment is crucial, facilitating data sharing, privacy protection, and providing digital innovations to stakeholders. AoW2 Action Lab depends on strong interdisciplinary collaboration within CGIAR and with external partners, ensuring that

diverse perspectives inform digital tool development. We assume that investments in Action Lab can be co-financed with bilateral investments in many cases. Additionally, it is assumed that sustained funding and resources will be available to support these efforts and the continued integration of emerging technologies and data advancements.

Interactions with Areas of Work and other Programs

AoW2 Action Lab's success relies on collaboration with other AoW and Programs. For example, Action Lab will co-invest with AoW1 Data Ecosystem efforts to develop LLMs that integrate semantic web ontologies to query CGIAR databases. It will collaborate with AoW3 Digital Futures to incorporate the latest technologies and approaches into its digital tools and models, and scale relevant innovations with partners. Collaboration through the innovation hub network (AoW4 Enabling Environment) and leveraging the increasingly interoperable and AI-ready outputs of AoW1 Data Ecosystem will ensure that tools are future-ready and integrated with CGIAR's digital infrastructure.

AoW2 Action Lab will work with other Programs and bilateral projects to co-develop products that address specific use cases. Early collaborative efforts are anticipated with Programs such as Climate Action, Better Diets and Nutrition, Sustainable Farming, and Policy Innovations, to aggregated data to enhance FLWs monitoring and decision-making processes. We also anticipate work with external partners such as YOMA-UNICEF to co-develop and scale citizen science that upskills women and youth, and Digital Green and Sprout Open Content to enhance digital extension services and training across various countries.

Table 3: AoW2 ToC table

(dark blue = initial work; light blue = work through 2030)

ToC #	Statement	Programs	Accelerators		Genebanks	External partners					Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
			Capacity Sharing	Gender Equality		ARIs	NARES	Governments	Private sector	Public sector		
OP 2.1	CGIAR Large Language Model											
OP 2.2	GenAI pilots leveraging CGIAR datasets											
OP 2.3	Modular models and data synthesis products for CGIAR FLW domains											
OP 2.4	Platforms for community-driven data collection and localized insights											
OP 2.5	Adaptive learning algorithms within fisheries and agricultural systems											
OP 2.6	Trainings on ethical, inclusive design of AI integrated solutions											
OP 2.7	Citizen science and youth upskilling platforms											
OP 2.8	Policy design toolkit for AI decision support tools in FLW systems											
I-OC 2.1	Decision-makers are empowered with tailored,										Decision-makers are	

	accurate, and contextually relevant data, leading to better-informed choices										capable and willing to explore new tools	
I-OC 2.2	Users experience more intuitive and real-time access to CGIAR datasets and advisories, fostering greater engagement and insight sharing.										CGIAR data ecosystem supports development of real-time analytics and enhanced insights	
I-OC 2.3	Local communities are empowered through upskilling and participation in data collection, leading to more localized and actionable insights.										Upskilling opportunities are relevant, aspirational and respond to demand	
I-OC 2.4	Partners and stakeholders gain enhanced capacity to leverage synthesized data and advanced analytics for sustainable agricultural practices										Solutions respond to demand and provide accurate, localized options	
2030-OC 2.1-	CGIAR and partners using AI tools to accelerate innovation and decision-making										CGIAR and partners champion and incentivize AI tools development and collection of	≥60% of Programs and key partners use AI tools to accelerate innovation and

											standardized data	decision-making
2030-OC 2.2-	Youth and communities are pivotal stakeholders in digital and data management of agricultural systems										Diverse perspectives continue to inform the development of digital tools and investments are co-financed with bilateral projects	≥20 CGIAR partners can evidence data driven management of FLW systems by youth and communities

6.3 Digital futures

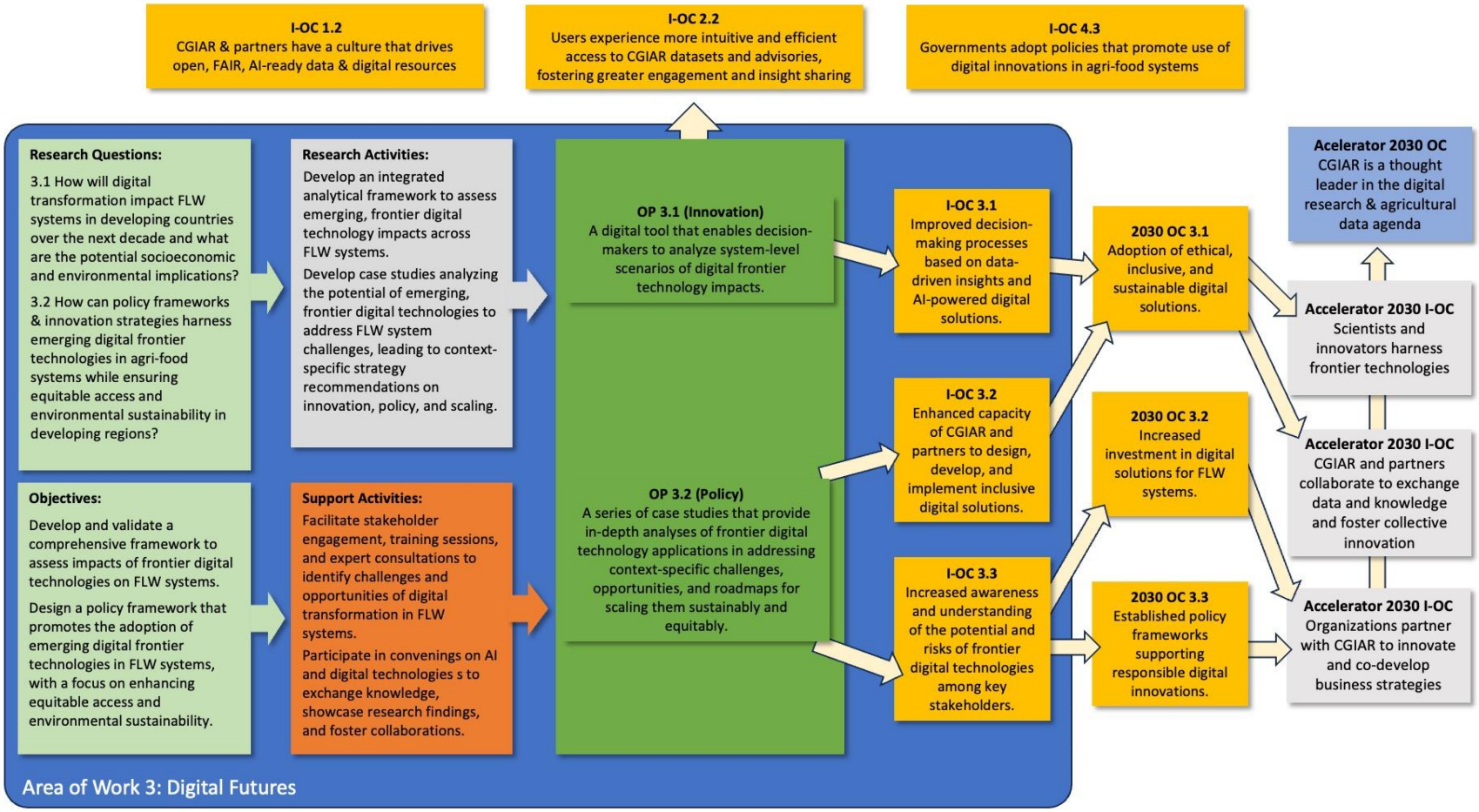


Figure 4: AoW3 ToC visual

Overall ambition

Rapid advances in digital technologies present unprecedented opportunities to address complex challenges in FLW systems.

AoW3 Digital Futures will identify and explore emerging digital frontier technologies with the potential to transform FLW systems, enabling CGIAR to stay ahead of technological trends and anticipate future challenges and opportunities. By facilitating critical discussions among diverse stakeholders, Digital Futures will create a platform for collaborative problem-solving and consensus-building, ensuring that the development and implementation of digital solutions are guided by comprehensive understanding of their potential impacts and ethical implications.

Fostering partnerships between technology innovators, researchers, policymakers, and practitioners will complement CGIAR strengths by leveraging needed expertise and resources, accelerating development and piloting of novel digital solutions for FLW systems. This proactive approach will position CGIAR as a key influencer in shaping technological trajectories, policy frameworks, and investment priorities, ensuring that digital innovations in FLW systems are aligned with sustainability, equity, and food security goals.

Research questions and justification

3.1. How will digital transformation impact FLW systems in developing countries over the next decade, and what are the potential socioeconomic and environmental implications?

Current global challenges are unprecedented in their scale and complexity, making rapid innovation increasingly important to alleviate crises. Without strategic foresight and careful consideration, applied technologies could deepen inequalities, strain already scarce resources, and create new dependencies. Anticipating their broader social and environmental impacts and ensuring they are applied in ways that address the root causes of global challenges is also critical. Given the potentially far-reaching implications of emerging technologies for food security, rural livelihoods, and environmental sustainability, it is essential to guide responsible development and implementation of digital technologies in FLW systems, maximizing benefits, and mitigating or preventing negative consequences. AoW3 Digital Futures will conduct comprehensive foresight analyses of the implications of AI and other digital frontier technologies for different stakeholders in FLW system contexts.

3.2. How can policy frameworks and innovation strategies harness emerging digital frontier technologies in agri-food systems, while ensuring equitable access and environmental sustainability in developing regions over the next decade?

The massive influx of data and rapidly emerging new technologies coupled with incoherent policies makes it increasingly difficult to analyze and leverage this information effectively. As AI and digital innovations advance, they risk deepening the digital divide without proactive policies to address equity and inclusion. Furthermore, the environmental impact of data centers and digital intervention —critical for processing vast amounts of data—demands urgent policy attention to ensure sustainable practices. There is a critical need for forward-thinking, cohesive policies and innovation strategies that not only harness the potential of digital technologies but also ensure they are deployed in a way that does not harm communities or the environment. These challenges underscore the importance of creating forward-looking, cohesive policies that guide the responsible and equitable integration of digital technologies into agri-food systems.

High-level activities and outputs

Activity 3.1. Develop an integrated analytical framework for assessing emerging, frontier digital technology impacts across FLW systems, incorporating trade-off analyses to evaluate multidimensional costs, benefits, and synergies across social, economic, and environmental domains. [OP3.1]

We will develop a comprehensive foresight analysis framework to assess the impact and risks of digital frontier technologies. By reviewing current FLW systems research and decision-making processes, AoW3 Digital Futures will identify opportunities and risks of integrating these emerging technologies, using human-centered design principles to understand stakeholder needs. The framework will synthesize existing methodologies to create an integrated approach for evaluating multi-dimensional impacts, incorporating quantitative and qualitative indicators across social, economic, and environmental domains. The framework will feature foresight data, trade-off analysis tools, scenario planning techniques, and ethical considerations to explore future trajectories and potential conflicts. Engaging diverse stakeholders, from smallholder farmers to policymakers, the framework will be piloted in selected case studies and refined for broader applicability. User-friendly visualization tools, guidelines, and training materials will support its adoption, with a mechanism for continuous updating. This framework will facilitate evidence-based strategizing in harnessing digital technologies across FLW systems, ensuring innovations contribute positively to equity, development, and sustainability.

Activity 3.2. Develop a series of case studies, analyzing the potential of emerging, frontier digital technologies in addressing FLW system challenges, leading to context-specific strategy recommendations on innovation, policy, and scaling. [OP3.2; OP3.3]

This research activity will develop forward-looking case studies that explore the transformative potential of frontier digital technologies to address critical FLW system challenges and assess ethical implications and potential risks associated with AI and digital frontier technologies. Example themes include the impact of robotics and sensors in the context of changing labor dynamics and climate-induced challenges; the evolution of digital education and its influence on youth employment and rural-urban migration patterns; and the future of markets and trade, considering how digital media influence consumer preferences and culture. The research will employ several techniques, such as scenario analysis, facilitated debates, and speculative design (working out possible uses of frontier technologies in a hands-on, future-oriented way). The activities will generate shared visions of inclusive digital transformation in FLW systems. A central multi-stakeholder approach will convene public and private partners to generate context-specific policy recommendations and scaling strategies. These will be delivered through issue/situation briefs, Program collaborative case studies, trainings, and proposals for new use cases to be taken further by AoW3 Digital Futures and bilateral projects.

Assumptions

The success of AoW3 Digital Futures relies on several key assumptions, including that digital technologies continue to advance and offer relevant solutions for FLW systems, providing opportunities for accelerated innovation and improvement. There is an expectation that stakeholders will engage in collaborative efforts to address digital challenges, participating in forums, assessments, and partnerships. We also assume that when properly managed, the benefits of digital solutions will outweigh potential risks, justifying continued investment and development in these technologies.

Interactions with other Areas of Work and other Programs

AoW3 Digital Futures will maintain interactions with other key AoWs within the Accelerator, Programs and partners. Digital Futures will work closely with AoW2 Action Lab, participating in developing reference designs and investment cases for AI-powered decision-support tools and extension programs. This collaboration will ensure theoretical innovations are translated into practical applications for scaling and impact. The policy briefs and investment case documents produced by Digital Futures will contribute to the AoW4 Enabling Environment, informing policy-making and facilitating digital innovation in FLW systems. Data challenges identified in the assessments will be addressed through exploring roles that digital frontier technologies can play in addressing challenges. This work will benefit from growing interoperable, AI-ready multi-domain data while enhancing CGIAR's overall data-management and utilization capabilities delivered through AoW1 Data Ecosystem.

Table 4: AoW3 ToC table

(dark blue = initial work; light blue = work through 2030)

ToC #	Statement	Programs	Capacity Sharing	External partners						Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
				ARIs	NARES	Govs	Private Sector	Public Sector	Other		
OP3.1	A digital tool that enables decision-makers to analyze system-level scenarios of digital frontier technology impacts.								Tech think-tanks		
OP3.2	A series of case studies that provide in-depth analyses of frontier digital technology applications in addressing context-specific challenges, opportunities, and roadmaps for scaling them sustainably and equitably.								Tech think-tanks		
I-OC3.1	Improved decision-making processes based on data-driven insights and AI-powered digital solutions.									Decisions not excessively constrained by institutional factors	
I-OC3.2	Enhanced capacity of CGIAR and partners to design, develop, and implement inclusive digital solutions.									Researchers have interest in collaborations around this.	
I-OC3.3	Increased awareness and understanding of the potential and risks of frontier digital technologies among key stakeholders.									Stakeholders have an interest in digital frontiers.	
2030-OC3.1	Adoption of ethical, inclusive, and sustainable digital solutions.									Solutions are the result of an appropriate, inclusive design process	≥5 novel digital solutions adopted across

ToC #	Statement	Programs	Capacity Sharing	External partners						Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
				ARIs	NARES	Govs	Private Sector	Public Sector	Other		
											CGIAR and partners
2030-OC3.2	Increased investment in digital solutions for FLW systems.								Funders	Investment-ready solutions are available	>10 m USD is invested by funders in development / deployment of digital solution
2030-OC3.3	Established policy frameworks supporting responsible digital innovations.									Policymakers prioritize responsible digital innovations	≥3 policy frameworks established with CGIAR's input

6.4 Enabling environment

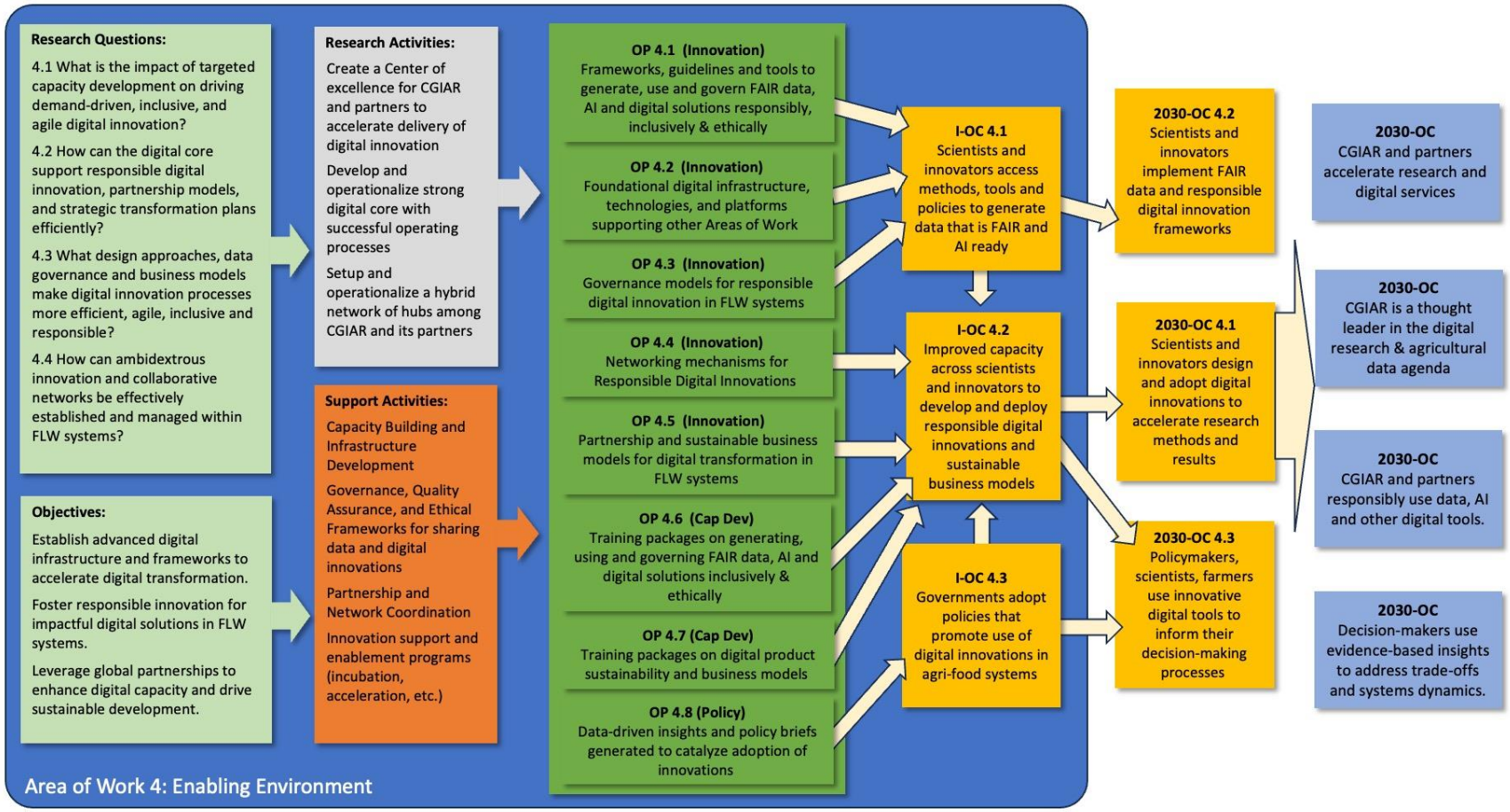


Figure 5: AoW4 ToC visual

Overall ambition

AoW4 Enabling Environment will address systemic constraints in the enabling environment including digital infrastructure, data management, institutional collaboration, digital literacy and skills in FAIR and AI-ready data, responsible digital innovation, sustainable business models and others. It also seeks to advocate common policies on data sharing, standardization, governance, and to break adoption barriers through inclusive locally tailored digital design and sustainable business models. The resulting dynamic ecosystem will promote a responsible and inclusive innovation culture, ensuring that digital solutions are cutting-edge, contextually relevant and widely supported, benefiting smallholder farmers and vulnerable populations.

Research questions and justification

The central research question addresses how CGIAR can effectively enable collaboration with and between diverse stakeholders to unlock the potential of data and frontier technologies for transforming FLW systems.

4.1 What is the impact of targeted capacity development on driving demand-driven, inclusive, and agile digital innovation?

Targeted capacity development is essential for enabling stakeholders to efficiently engage with and utilize digital technologies. This question explores how targeted training and upskilling can drive demand-driven innovation, ensuring that digital tools and solutions are responsive to the needs of diverse actors in FLW systems (OP1.6, OP1.8). By understanding the impact of capacity development, CGIAR can design programs that foster digital literacy and innovation across the value chain.

4.2 How can the digital core support responsible digital innovation, partnership models, and strategic transformation plans efficiently?

The digital core (OP1.2), comprising foundational infrastructure and integrated platforms, is the backbone of digital transformation efforts. This question seeks to explore how the digital core can be optimized to support responsible innovation, facilitate effective partnerships, and drive strategic transformation plans across other AoWs and Programs (I-OC4.1, 2030 OC4.2).

4.3 What design approaches, data governance and business models make digital innovation processes more efficient, agile, inclusive and responsible?

Effective governance (OP1.1, OP1.3), sustainable business models (OP1.5) and thoughtful design (OP1.7) are crucial for efficient and responsible digital innovation processes (I-OC4.1, I-OC4.3, 2030 OC4.1, 2030 OC4.3). This question examines the governance mechanisms, design approaches, and data governance models that best support agile, inclusive, ethical innovation, to ensure that digital tools are developed and deployed in alignment with CGIAR's values and objectives.

4.4 How can ambidextrous innovation and collaborative networks be effectively established and managed within FLW systems?

Ambidextrous innovation networks (OP1.4) that balance exploration of new ideas with the exploitation of existing capabilities, are vital for sustaining long-term innovation and collaboration (OP1.5). This question explores how such networks can be effectively established and managed within FLW systems, enabling CGIAR to support breakthrough innovations and continuous improvements (I-OC4.2, I-OC4.3, 20230 OC4.2, 2030 OC4.3).

High-level activities and outputs

Activity 4.1. Coalescing a Network of Hubs. [OP4.1, OP4.4, OP4.5, I-OC4.1, I-OC4.2, I-OC 1.2, I-OC2.1, I-OC2.2]

The Network of Hubs is designed to integrate activities from AoW1 Data Ecosystem, AoW2 Action Lab and AoW3 Digital Futures, along with essential cross-cutting functions to develop user-centric, demand-driven, contextualized and scalable digital innovations. We envision a decentralized network of innovation hubs, with one hub located at ATRC in Abu Dhabi and other hubs elsewhere.

The ATRC hub will serve as the global hub for the AI theme. It will leverage ATRC's advanced hardware, software, business consulting, and innovation management services. This hub will act as an access point for state-of-the-art capabilities, facilitating the flow of resources and expertise across the network. Hubs in other regions will be established by CGIAR Centers following an agreed format. This Network of Hubs will foster bi-directional communication and collaboration through existing local networks to detect demand, facilitate collaboration, share capacity, and engage with local partners. The network is responsible for operationalizing demand, ensuring alignment with Digital Transformation's strategic objectives. The activity will create a coherent plan for establishing this Network of Hubs and engage with CGIAR Centers and development and delivery partners to implement this plan.

To stimulate innovation within CGIAR and its partner communities, the network will employ mechanisms such as hackathons and a flagship innovation challenge, building on lessons from the Big Data Platform INSPIRE Challenge, and ATRC's expertise in designing and executing innovation challenges. These activities will encourage the development of digital solutions for region-specific challenges, leveraging global technologies and local knowledge. The activity will also continue CGIAR support for ICTforAg, a global conference and learning network.

Activity 4.2. Setting up digital core infrastructure. [OP4.2, I-OC4.1, I-OC1.2, I-OC2.2]

AoW4 Enabling Environment will create a Digital Core will serve as the central backbone of CGIAR's digital transformation efforts, providing essential infrastructure, tools and capacities needed to support advanced data analytics, AI, and other digital technologies. Facilities and activities include standardization, interoperability, common cloud-based infrastructure, robust security measures to ensure data privacy and compliance, continuous monitoring, and threat assessment to proactively address potential vulnerabilities. This core will enable seamless data flows, integration with cloud services, and support for emerging technologies, ensuring CGIAR remains at the forefront of digital innovation in agriculture. By concentrating these services in a single core, CGIAR can be more efficient in delivering state-of-the-art capabilities to its researchers, taking advantage of emerging technologies and complying with emerging regulations. Beyond the provision of technical infrastructure, Digital Core will support capacity building activities, such as training and mentoring to enhance skills related to digital infrastructure, in close coordination with AoW1 Data Ecosystem.

Activity 4.3. Creating a Centre of Excellence for data and digital. [relevant for multiple OPs and OCs]

The Digital Transformation Center of Excellence is a mechanism to mobilize and aggregate expertise within CGIAR and partners to deliver digital transformation objectives. Some of the identified focus areas include: (i) HCD; (ii) GESI in digital transformation; (iii) scaling and capacity sharing in digital Transformation; (iv) ethics in AI; (v) FAIR and AI-ready data; (vi)

collaborative data governance; (vii) behavioral change and innovation management and (viii) digital business development (including intellectual property (IP) rights). In these focus areas, the Center of Excellence will provide leadership and vision; generate strategies; detect emerging trends and needs; promote best practices; integrate existing regulation and standards, and build capacities. The Center of Excellence will also lead/commission research addressing specific emerging needs, for example guidelines for AI use. The Center of Excellence will be operationalized through the Network of Hubs and CGIAR Centers.

Assumptions

We assume that strong partnerships and collaboration among diverse stakeholders are feasible and desirable for driving digital transformation; capacity-building initiatives effectively equip stakeholders with the necessary skills to utilize digital tools; sufficient and high-quality data will be accessible for analysis and decision-making; the policy environment will support adoption and use of digital technologies; adequate financial resources are available to support the initiative; and the ethical implications of data privacy, security, and responsible innovation will be effectively addressed.

Interactions with Areas of Work and other Programs

AoW4 Enabling Environment provides the necessary infrastructure, skills and governance frameworks that underpin AoWs 1-3. The Network of Hubs provides a collaborative platform for testing and scaling the use cases generated by AoW2 Action Lab, and will lead interactions with Programs and Centers to identify demand and facilitate linkages with the other AoWs.

Table 5: AoW4 ToC table

(dark blue = initial work; light blue = work through 2030)

	Statement	Programs	Accelerators		Genebanks	External					Assumption (for outcomes only)	Indicator and target (for outcomes only)
			Gender Equality	Capacity Sharing		ARIs	NARES	Govs.	Private sector	Public sector		
OP4.1	Frameworks, guidelines and tools to generate, use and govern FAIR data, AI and digital solutions responsibly, inclusively & ethically											
OP4.2	Foundational digital infrastructure, technologies, and platforms supporting other Areas of Work											
OP4.3	Governance models for responsible digital innovation in FLW systems											
OP4.4	Networking mechanisms for Responsible Digital Innovations											
OP4.5	Partnership and sustainable business models for digital transformation in FLW systems											
OP4.6	Training packages on generating, using and governing FAIR data, AI and											

	Statement	Programs	Accelerators		Genebanks	External					Assumption (for outcomes only)	Indicator and target (for outcomes only)
			Gender Equality	Capacity Sharing		ARIs	NARES	Govs.	Private sector	Public sector		
	digital solutions inclusively & ethically											
OP4.7	Training packages on digital product sustainability and business models											
OP4.8	Data-driven insights and policy briefs generated to catalyze adoption of innovations											
I-OC 4.1	Scientists and innovators access methods, tools and policies to generate data that is FAIR and AI ready										High-quality data will be available and accessible	
I-OC 4.2	Improved capacity across scientists and innovators to develop and deploy responsible digital innovations and sustainable business models										Training programs will be effective and widely adopted	
I-OC 4.3	Governments adopt policies that promote use of digital innovations in agri-food systems										Governments will be receptive to policy recommendations	

	Statement	Programs	Accelerators		Genebanks	External					Assumption (for outcomes only)	Indicator and target (for outcomes only)
			Gender Equality	Capacity Sharing		ARIs	NARES	Govs.	Private sector	Public sector		
2030-OC 4.1	Scientists and innovators implement FAIR data and responsible digital innovation frameworks										Frameworks will be practical and implementable	60% of Programs using FAIR data principles by 2030
2030-OC 4.2	Scientists and innovators design and adopt digital innovations to accelerate research methods and results										Digital innovations will be effective, relevant and scalable	60% of Programs using digital innovations to accelerate research methods and results by 2030
2030-OC 4.3	Policymakers, scientists, farmers use innovative digital tools to inform their decision-making processes										Digital tools will be user-friendly and accessible Stakeholders will be open to test and co-design tools	50% of target stakeholders using digital tools for decision-making by 2030

7. Boundaries and linkages with other portfolio components

7.1 Boundaries with other components of the Portfolio

While all Programs have digital and data outputs contributing to their outcomes, Digital Transformation can complement these by aggregating skills, infrastructure and the knowhow necessary to co-create data and digital solutions through well-defined use cases. Through its Digital Core sub-AoW, the Accelerator offers the means to harness digital infrastructures, human capacities, partnerships within Centers in this co-creation process, aiming for synergistic engagement across Centers and Programs, strengthening Center-level data and digital innovation processes and capacities, including FAIR management of data assets. The Accelerator will focus on conceptualizing, developing and deploying data and digital solutions incorporating HCD and inclusive design principles, embedded FAIR data workflows and compliance with global computing and technology standards. Programs and Accelerators will articulate the social, bio-physical and institutional context and demands within which digital innovations are to be deployed – including limitations, local partnerships and necessary domain expertise. This forms a strong collaborative foundation for the broad requirements/contours of expected digital and data outputs.

We will use the use case approach to navigate these conversations and jointly develop requirements and specifications. Following this, Digital Transformation will propose solution designs, working with collaborators across Centers and Programs to develop and deploy solutions which integrate human-centered design, FAIR, and other agreed standards. This clear delineation of competencies and orchestration of the digital innovation workflow will minimize duplication and ensure that digital and data innovations portfolios across Programs and Centers are converging towards common technology stacks and global best practices. Digital Transformation is dedicated to building research and operational capacity within CGIAR and its partners while maintaining an approach that spans across regions, countries, and disciplines.

7.2 Linkages across the Portfolio and with external stakeholders

Linkages with Programs and Centers

As stated above, Digital Transformation will collaborate with Centers, Programs and external partners to prioritize and co-develop digital initiatives through the methodology described in Section 3, with early pilots anticipated with Sustainable Farming, Climate Action, Breeding for Tomorrow, Multifunctional Landscapes, Sustainable Animal and Aquatic Foods, and Better Diets and Nutrition. We will support Programs and partners to co-develop and leverage digital technologies, increasing precision and scalability of outputs towards impactful and sustainable agricultural innovations. For example, early scoping consultations between Programs and Digital Transformation identified the need for a purpose-built LLM fine-tuned for agricultural research, powered by AI and CGIAR's vast research data and publications. This digital tool will transform the way CGIAR researchers and external partners search for and receive analyzed information in natural language from CGIAR data and knowledge available through GARDIAN and other means.

Scaling for Impact is critical to the Accelerator's mission of translating research into real-world applications. The Center of Excellence focus area on scaling and serves as a nexus for activities and collaborations between Digital Transformation and Scaling for Impact. The Accelerator will co-design initiatives with Centers and Programs, working with Scaling for Impact to ensure scalability and tailoring to specific needs and contexts in target regions and communities. It will continuously refine and adapt digital solutions based on ground realities and evolving needs through regular consultations with Scaling for Impact stakeholders via the Network of Hubs and collaborative planning sessions.

The Accelerator proposes an operational model (see table below) across the stages of demand identification, alignment and prioritization and implementation. This ensures coherence, minimizes duplication, and supports prioritization and inclusive identification and execution of use cases (see Figure 6). Linkages will be operationalized through shared funding, co-developed digital infrastructure, and common indicators. This approach will ensure that digital transformation is integrated into core research activities of Programs to amplify impact.

Table 6: Distribution of responsibilities with partners

Stage	Responsibility	Partners	Description
Demand identification	Accelerator leadership and Programs	Programs, Accelerators, Network of Hubs, local partners	The Accelerator proposes a use case approach that engages diverse stakeholders to be demand-responsive. The Network of Hubs offers an institutional mechanism to gather insights and data across sectors and regions. Accelerator leadership and Hub Experts will engage with business development partners, Programs, and Centers to articulate demand through a common rubric, prioritizing the most impactful and relevant projects.
Alignment and prioritization	Accelerator leadership and Hub Experts	Programs, Accelerators, Network of Hubs, CGIAR Centers	The Network of Hubs and key stakeholders will align use cases with Accelerator priorities and strategic objectives to deliver the highest value for CGIAR. A coherent plan will leverage strengths of the Network of Hubs, CGIAR Centers and development and delivery partners for efficient resource allocation, and maximal success.
Implementation	Accelerator leadership	Programs, Accelerators, Network of Hubs, CGIAR Centers, local partners	Each project/activity will draw expertise from Programs, Accelerators, and Centers. AoW2 Action Lab and AoW3 Digital Futures will lead/feature innovative projects and forward-looking initiatives. AoW1 Data Ecosystem will support data management and integration, working with data managers, researchers, data scientists, and ideally, a CGIAR Data Office. AoW4 Enabling Environment will offer foundational infrastructure and tools, involving a cross-Center multi-disciplinary team. Throughout this phase, Accelerator and Program teams ensure accountability and oversight, guiding projects to success.

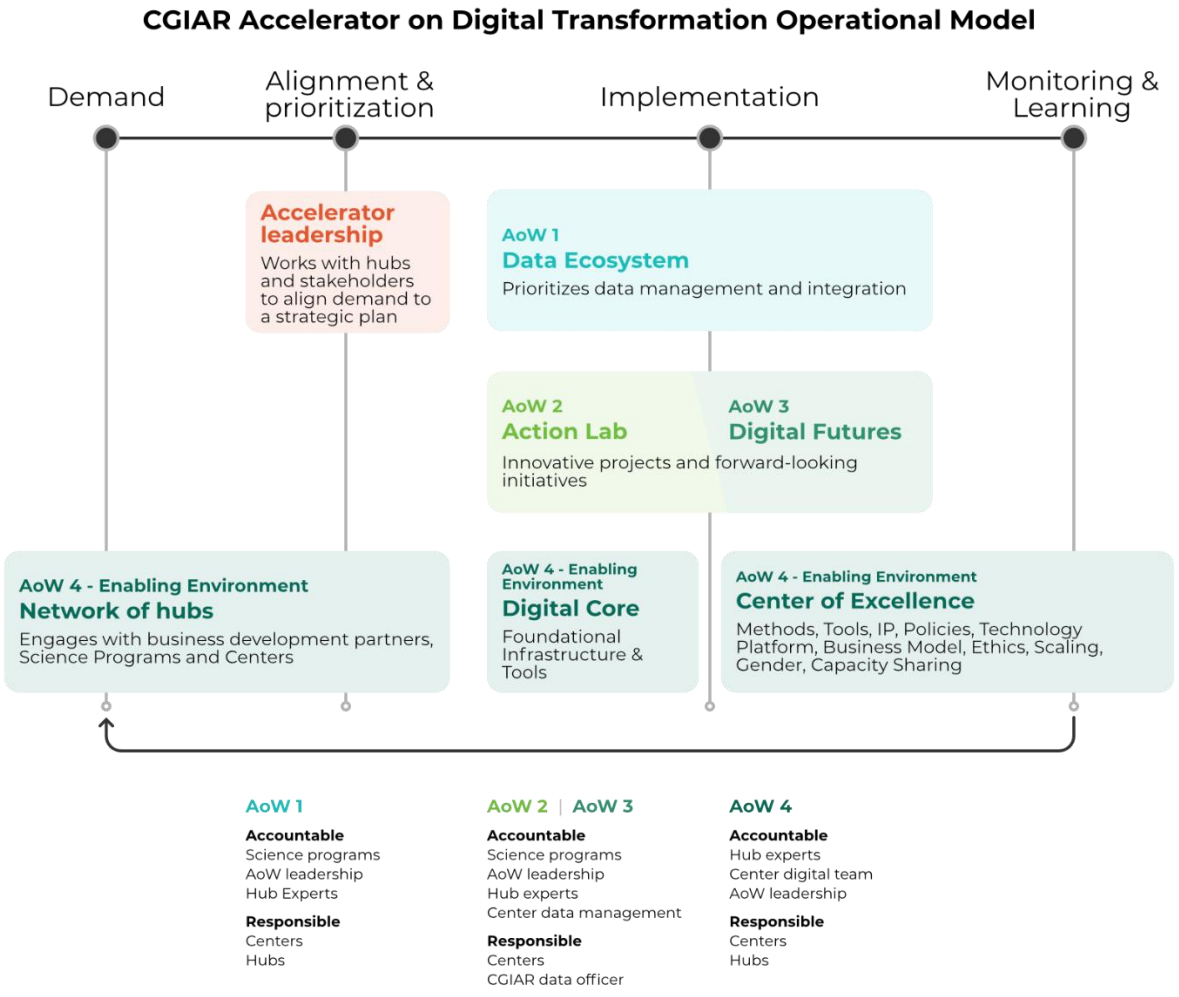


Figure 6: Operational model for the Digital Transformation Accelerator

Linkages with Accelerators

Digital Transformation will collaborate with Gender Equality and Inclusion to ensure that digital innovations are designed and implemented to promote gender equality and social inclusion. The Center of Excellence focus area on Gender Equality and Social Inclusion (GESI) serves as a nexus for GESI-targeting activities and collaborations. By co-opting Gender Equality and Inclusion in use case conceptualization and development workflows, we will strive to make digital tools and platforms accessible and beneficial to women and marginalized groups. Further, we will develop training modules and resources tailored to the needs of women, young farmers and vulnerable communities, ensuring they have skills and knowledge to leverage digital technologies effectively. Shared activities will include joint research, capacity enhancement workshops, and developing gender-sensitive indicators to measure the impact of digital solutions. By integrating GESI principles into digital transformation initiatives, both Accelerators will enhance the inclusivity and impact of CGIAR's work.

Digital Transformation will also work closely with Capacity Sharing to enhance data and digital competencies across CGIAR and key partners. The Center of Excellence's focus on capacity sharing is a link to enhance digital capacity of researchers, institutions, and local communities, facilitating effective utilization of digital technologies. Joint activities include developing and disseminating digital literacy programs, establishing shared digital platforms and resources, and facilitating knowledge exchange through online forums and webinars. By aligning efforts with Capacity Sharing, we aim to create a digitally skilled workforce capable of driving innovation and achieving greater impact.

External partnerships

Developing enduring partnerships with external stakeholders is crucial for the success of this Accelerator. We will collaborate with a diverse range of partners, including government agencies, private sector companies, non-governmental organizations, think tanks, technology companies and international research institutions. These partnerships will enhance access to additional resources, expertise, technologies and networks, thereby expanding the Accelerator's reach and impact. These partnerships will involve joint funding agreements, collaborative research and development, and co-creation of market-ready products.

8. Monitoring, evaluation, learning and impact assessment (MELIA)

8.1 Monitoring, evaluation and learning (MEL)

The Accelerator will implement a comprehensive MEL system to track progress, drive continuous improvement, and generate learnings to inform implementation and future directions. MEL activities will be organized at both Accelerator and individual AoW levels, focusing on harmonizing approaches across pooled and bilateral funding components.

Activities at the Accelerator level

The Accelerator will establish a dedicated MEL team, comprising experts in monitoring, evaluation, and data analysis. This team will design and implement the MEL framework, working closely with research and delivery teams to ensure alignment with Accelerator objectives and define output-level and outcome-level key performance indicators (e.g., number of FAIR data assets; digital solutions deployed; increased use of data and digital tools by stakeholders).

The Accelerator will develop standardized data collection tools and protocols, including digital platforms for real-time data collection, dashboards for data visualization, and regular reporting mechanisms to provide actionable insights.

The Accelerator will offer tailored training programs to research and delivery teams to strengthen their MEL competencies, focusing on data collection methods, impact evaluation techniques, and the use of digital tools for monitoring and reporting.

The MEL system will include bi-annual review cycles to assess progress along the Accelerator's ToC and intervention strategies, involving internal workshops, external consultations, and stakeholder feedback loops. Strategies will be adjusted based on collected evidence. Lessons

learned will be documented using structured templates and stored in a centralized repository, with regular knowledge-sharing, including webinars, reports, and case studies to disseminate findings across CGIAR.

8.2 Impact assessment

The Accelerator's impact assessment strategy will generate empirical evidence on digital acceleration processes towards CGIAR's Impact Areas: Nutrition, Poverty, Gender, Climate, and Environment. The assessment will employ a mixed-methods approach, incorporating both quantitative and qualitative techniques to capture evidence at different levels (e.g. farmers/farm, local organizations, governments, research).

A comprehensive set of impact metrics will be developed, aligned with the three defined contributing impacts (closing data and analytics gaps, locally adapted solutions, timely decision-making) and CGIAR Impact Areas. These metrics will be used to measure outcomes related to agricultural productivity, profitability, resilience, equity, and environmental sustainability.

The Accelerator will conduct baseline studies in target regions to establish initial conditions against which changes can be measured, recognizing that establishing causality will take careful consideration. These studies will gather data on key indicators such as agricultural yields, household incomes, climate adaptation practices, and nutritional outcomes.

Assessments will be conducted at multiple scales—from household to national—across diverse geographies, ensuring context-specific insights. Partnerships with national research institutes and other organizations will enable data pooling, cross-Program synergies, and meta-analyses.

Findings will be synthesized into reports for stakeholders, offering evidence-based recommendations for scaling successful interventions and refining strategies. Adequate resources, including funding and skilled personnel, will be allocated to ensure rigorous assessments and their integration into decision-making processes.

9. Capacity sharing

The Accelerator is strategically positioned to enhance digital and data capacity development and sharing to transform FLW systems. Capacity sharing is also at the core of its mission, fostering collaboration across CGIAR and partners from public and private sectors, and enabling them to leverage shared resources and expertise in digital transformation. This collaborative environment is essential, as it encourages the exchange of best practices and innovative solutions for digital transformation.

The Accelerator's capacity sharing strategies encompass all four AoWs. The Accelerator will engage with Capacity Sharing, Programs and partners, including governments, National agricultural research and extension systems (NARES), ARIs, and NGOs, to improve capacity in data and digital innovation at the individual, organizational, and institutional levels.

To ensure effective and sustainable capacity sharing, the Accelerator will work through a comprehensive framework that includes assessing digital capability and needs through stakeholder analysis, co-designing training programs, and co-developing digital infrastructure. Capacitation will also help bridge the digital divide and enable broader reach of digital solutions and innovations. The Accelerator's capacity-sharing actions are focused on four essential

components: (i) learning materials and approaches, (ii) gender-sensitive approaches, (iii) institutional strengthening, and (iv) organizational growth. Products generated will be made available as global or regional public goods accessible to a wider audience.

The Accelerator focuses on learning alliances for generating, using, and governing FAIR, AI-ready data and digital resources to enhance transformation in an inclusive and ethical manner across CGIAR and partners, particularly the NARES and ARIs. The Accelerator's Network of Hubs and strategic partnerships will facilitate knowledge exchange in cooperation with Capacity Sharing. This collaborative approach is crucial for developing a culture that drives a digital transformation among CGIAR and its partners, encourages joint governance of data and digital resources, creation of responsible data-driven solutions, and digital tools use.

This multifaceted approach includes comprehensive training programs designed to empower stakeholders with the necessary FAIR data skills, emphasizing the importance of ethical considerations in data and digital innovations. It will ensure that scientists and data-users across CGIAR and partners not only understand the principles of FAIR-ness, accountability, and transparency in AI applications, but also seek behavioral change and empowerment. The Accelerator will develop training modules, supporting material (e.g., videos and documents), and open online courses ensuring the benefits of digital solutions are accessible to all, particularly marginalized communities.

Trainings will emphasize technical skills and tools, advocacy, strategic thinking and innovation management to prepare CGIAR and its partners to lead in the data and digital age. The Accelerator is committed to building capacity and culture around digital solutions and innovative business models that equip CGIAR and partners to develop sustainable digital practices that can effectively address FLW challenges. These efforts will build on learnings from CGIAR Initiatives (e.g., Digital Innovation and Excellence in Agronomy). By fostering a culture that prioritizes open, FAIR data and responsible use of digital technologies, the Accelerator encourages stakeholders to build robust digital and data governance and ethical standards. This cultural shift is essential for creating an environment where FAIR data is not just a concept, but a foundational element in decision-making processes.

The Accelerator places significant emphasis on GESI approaches in its capacity sharing to address the different needs and capacities of men and women in the innovation space to address FLW challenges. Digital Transformation will undertake digital needs assessments for effective capacitation of data and digital stakeholders, prioritizing the needs of women to enhance their opportunities to benefit from and contribute to data and digital transformation. Lastly, the Accelerator will explore post-doctoral positions for gender specialists to support gender-sensitive research in data and digital innovation.

10. Gender and social inclusion

Objectives

The Accelerator will support and conduct research and design processes that help CGIAR and its partners to ensure that digital innovations, data management systems, and the enabling environment are inclusive, encompassing diverse needs, contextual aspects, and digital ecosystem characteristics. A strong focus on GESI assures that digital innovations and data

help narrow existing social and economic divides, and address the following persisting challenges:

- Digital divide in FLW systems, manifested by a lack of access to digital device, digital media, infrastructure, or insufficient digital literacy to benefit from services, and lacking enabling environments and policy frameworks to overcome this divide.
- Lack of attention to the needs, roles, and aspirations of youth and their potential to lead rural digital transformation.
- Data sparsity/inadequacy/bias, leading to decision making that is not inclusive.
- Knowledge gaps in the ethical and equitable use of generative AI technology.

Research questions

What are the needs, challenges, and future aspirations of underrepresented groups in digital FLW systems and how can we use these insights to inform and guide the design, implementation, and scaling of inclusive digital tools in FLW systems?

How can we transform data generation, management, and standardization in CGIAR and partner organizations to inform inclusive decision-making processes in the FLW systems?

How can we leverage our research and design experience in digital FLW systems to support enabling conditions and policy frameworks that recognize and address the diversity of user groups and stakeholders in the digital ecosystem?

Key areas of opportunity

1. People and context: Conduct research with a focus on human-centered, context-aware understanding of the needs and challenges of youth, women, and other underrepresented communities to inform digital tool design, interventions, and capacity building based on their digital agriculture vision and expectations.

2. Digital tools and data: Design and develop data management systems and digital tools that address the specific needs and challenges of diverse user groups and inform inclusive decision-making.

3. Ecosystem and enabling environment: Inform and support the creation of a supportive digital ecosystem and an enabling environment that promotes inclusive decision-making, policy development, and ethical use of AI.

GESI in each Area of Work

AoW1 Data Ecosystem entail ensuring FAIR, AI-ready, gender-disaggregated data for inclusive decision-making, and supporting data integration and ethical AI usage in collaboration with the GESI Accelerator. Outputs include solutions to address biases in AI and support data integration across domains to address GESI barriers, and tools that integrate socioeconomic dimensions with spatial/biophysical data.

AoW2 Action Lab involve exploring, designing, and developing user-centered tools. Three indicative focus areas include: enhance user experience (with UXtools4Ag), inclusiveness and digital tool adoption, while systematically leveraging user insights towards inclusive design systems; developing methods/tools to evaluate, monitor, and improve digital inclusiveness (e.g. the Multi-Dimensional Digital Inclusiveness Index [MDII] User Readiness Assessment); and developing modules for training and capacity sharing to help partners improve their digital skills.

AoW3 Digital Futures focuses on foresight research and speculative design to co-create inclusive and youth-centered visions of digital FLW systems that empower youth and other neglected social groups. Future trends in digital transformation will also be evaluated, particularly for job markets in FLW systems, with a focus on youth.

AoW4 Enabling Environment will inform inclusive policies, establish partnerships, and provide standards to create an inclusive digital ecosystem. Focus areas include research on user and stakeholder acceptance and perception of AI-generated content focusing on anti-bias and inclusivity; research on inclusive and human-centered AI applications in selected use cases with guidelines developed for implementing ethical AI practices; supporting the integration of regulations and standards for digital inclusion in CGIAR and partner networks (e.g. WCAG, primarily for persons with disabilities, as mentioned above). This also involves engaging in partnerships that enable digital inclusion in FLW systems, understanding and supporting capacity needs towards maximizing impacts, and guiding and informing strategies and policies that foster digital inclusion at CGIAR and across partners and stakeholders in FLW systems.

11. Climate change

Known impacts of climate change on Accelerator's Areas of Work

A key impact of climate change is that, in conjunction with other accelerated changes, it renders information obsolete. For example, local knowledge gradually loses its value as rainfall patterns change, new pests and diseases appear, or fish populations shift their geographical range. The creation of new knowledge and better risk management will all require an intensified effort in data generation, constant data processing and interpretation, and communication of findings in accessible formats to decision-makers, benefitting populations vulnerable to climate change. Secondly, climate change increases system complexity that decision-making needs to address. Climate change not only affects production but creates ripple-effects through FLW systems at all levels (e.g., trade, consumption), where climate impacts interact with other shifts (including biodiversity loss, cultural and demographic change), resulting in highly complex impacts. Better-integrated systemic responses are needed to address these challenges. Thirdly, climate change increases the overall uncertainty of change trajectories in FLW systems, which has led to calls for adaptive management and iterative feedback to supply decision-makers with more granular (near-) real-time information.

Planned work on climate-change adaptation and mitigation

Through a use case approach working especially with Climate Action and also across multiple Programs, Digital Transformation will support a range of efforts that emphasize climate as a key criterion in the prioritization process. The Accelerator will lay the foundation for more-effective climate adaptation through its investments in Data Ecosystem, making it possible to provide timely data-driven responses within often-narrow windows of opportunity for climate policies and decisions. Also, data interoperability will enable faster integration of data to address the complexity of climate adaptation. Targeted investments in digital development through AoW2 Action Lab will accelerate local data generation (e.g., citizen science) and adaptive decision-making (e.g., real-time monitoring and tradeoff analysis). In AoW2 Action Lab, use cases driven by Program demands will drive efforts focused on mitigation targets. In AoW3 Digital Futures, Digital Transformation will explore future scenarios, considering climate-adaptation trajectories. AoW4 Enabling Environment will address the enabling environment and scaling considerations

for climate solutions. We will support digital business development and anticipate substantial work on bundled approaches combining financial and information products that address climate-adaptation and -mitigation challenges.

Planned work on translating science into climate policies and action

The Accelerator aims to support the science-policy interface through dedicated efforts on human-centered design (AoW4), to facilitate translating science into relevant and understandable information products. Further, support for timely, data-driven decision-making through data and digital system investments will advance work along science-policy and science-action interfaces.

12. Risk management

Risks will be finalized and mitigation actions will be developed as part of the risk management plan during the Inception Phase.

Different risks can interact with and amplify each other. For example, a data breach (Data Security risk) could erode trust (Stakeholder Engagement risk) and increase costs (Infrastructure and Accelerator Continuity risk).

Table 7: Preliminary risks

Risk title	Risk statement
Data security	Security flaws could compromise data confidentiality, leading to potential legal or reputational damage
Data ownership	Lack of clarity on IP may hinder use of AI-ready data, affecting digital product adoption
Data integrity	Inconsistent data quality and regulatory environments could affect sustainability of the data ecosystem and governance to support FAIR principles
Data culture	Reluctance to require open, FAIR data, to value and incentivize it as a core CGIAR asset could affect efforts towards data-driven impact
Stakeholder engagement and adoption	Limited stakeholder buy-in, insufficient incentives or communication gaps could impede adoption and utilization of digital innovations, reducing their impact

13. Funding sources

Pooled funding

The Accelerator is designed with the ambition to leverage opportunities at the forefront of technology to transform FLW systems. While it builds upon the foundational work of the current Digital Innovation Initiative and its pooled funding, this Accelerator seeks to deliver on much larger, more innovative, and emerging areas of work that promise far-reaching impact.

A robust funding strategy must account for:

- **Scaling digital and data assets** developed under Digital Innovation, other initiatives or bilateral programs, ensuring they are maintained, upgraded, and innovated over the next six years.
- **Accelerating research and product development in the AI space**, focusing on tools like AI-enabled decision-making platforms and large-scale data ecosystems that support transformative innovation.
- **Creating an enabling environment** that supports digital innovation hubs, core digital infrastructure, and CGIAR's leadership in data governance, ethical AI use, and capacity building.

Given the scale and ambition of this Accelerator, the funding required to achieve its objectives is far greater than what has been available under the Digital Innovation Initiative. The **pooled funding** for the Initiative stands at less than [tbd], covering only [tbd]% of what the Accelerator needs to achieve its goals. Pooled funding will primarily support AoW1 Data Ecosystem and AoW4 Enabling Environment, including shared infrastructure and governance, ensuring that core resources and tools are accessible across Programs, Centers, and the broader network of partners.

Hence, to deliver on the ambitious goals of the Accelerator, a **strategic funding mix**, involving both pooled and bilateral funding sources is critical for success. To enable this, the Accelerator will seek to establish strategic partnerships with bilaterally supported projects by providing access to technical expertise to develop digital solutions, digital infrastructure to share data assets and analyze them, and a collaborative platform for knowledge exchange and capacity building, thereby leveraging additional resources and expertise while creating economies of scale to achieve its ambitious goals more efficiently.

Bilateral funding

While designated pooled funding will drive much of the Accelerator's early growth, **bilateral funding** will play a complementary role, supporting the scaling of digital and data programs, core infrastructure, governance, and specific Programs. The Accelerator will seek to secure additional pooled funding beyond the existing USD 5M from Digital Innovation to ensure that shared assets, such as data infrastructure and cloud computing resources are properly supported.

Bilateral funding will also play an essential role in **maintaining and expanding the FAIR and AI-ready data ecosystem** that underpins much of the Accelerator's work. As the Accelerator grows, a **mix of pooled and bilateral funding** will be necessary to sustain the shared digital and data assets and enable the scaling of innovations across Programs, Centers, and partners.

One of the initial challenges for Digital Transformation has been the **limited mapping of bilateral funding** (see Table 8). While some efforts have been made to align the Accelerator with existing Initiatives, such as Digital Innovation, the mapping of other bilateral programs has been minimal. Current initiatives with digital components have not been fully mapped into the Accelerator's Areas of Work, due to the approach taken. As Digital Transformation enters its Inception Phase, there will be a concerted effort to perform a deeper analysis of bilateral programs, identify ones that aligns with the Accelerator's ToC (e.g., Artemis and 1000 Farms), and establish strategic, synergistic partnerships.

Table 8: Bilateral programs initially mapped to Digital Transformation (Source: CGIAR Bilateral & Window 3 Mapping Dashboard; accessed September 17, 2024)

Title	Center	Funder	Mapped Budget (kUSD)
SERVIR West Africa II	ICRISAT	USAID-West Africa Trade and Investment Hub	8,427
ASIA-AFRICA BLUETECH SUPERHIGHWAY PROJECT (COAST)	WorldFish	United Kingdom FCDO	4,327
Climate-smart initiatives for climate change adaptation and sustainability in prioritized agricultural production systems in Colombia	ABC	Colombia-MADR-Ministerio de Agricultura y Desarrollo Rural	4,071
Artemis II - Field Phenotyping Prototype	ABC	Bill & Melinda Gates Foundation	3,938
Program for Seed System Innovation for VPCs in Africa (PROSSIVA)	IITA	Bill & Melinda Gates Foundation	3,434
Statistics from Space – Mozambique	IFPRI	Government of Korea	2,223
Accelerated Innovation Delivery Initiative	IITA	USAID	2,193
Accelerated Innovation Delivery Initiative for Mozambique	IITA	USAID	1,250
Liberia Land and Soil Resources Knowledge project (Soils4Liberia)	IITA	European Union	1,079
1000 Farms Research Platform	ABC	Bill & Melinda Gates Foundation	1,038
ISARC Phase III	IRRI	India-Department of Agriculture and Cooperation and Farmers Welfare	626
WaPOR Phase 2	IWMI	Netherlands - Ministry of Foreign Trade and Development Cooperation	600
A-2023-56	IRRI	United States Department of Agriculture	394
Malawi Digital Plant Health Service (MaDiPHS)	IITA	Norwegian Agency for Development Cooperation	281
Dev. & Scaling of Sus. Feeds for RAqFS in Sub-Saharan Africa	WorldFish	Norwegian Agency for Development Cooperation	178
Soil Information System for Africa (Soils4Africa)	IITA	European Union	149
Technologies for African Agri Transformation	WorldFish	African Development Bank	128
Accelerate for Impact Platform (A4IP) Year 2	ABC	Government of Italy	110
IKAN ADAPT	WorldFish	Food and Agriculture Organization	109
Development of the Ogun State Farmer Information Management system (OGFIMS)	IITA	World Bank	100
Counteracting the emergence of invasive and virulent plant-parasitic nematodes as driven by global warming and genetic selection	IITA	European Union	99
One health sustainability partnership between EU-Africa for food security	IITA	European Union	92
Strengthening Emergency Preparedness and Response to Food Crisis for Burundi, Comoros, Somalia and South Sudan (SEPAREF)	IITA	African Development Bank	86
ICAR 2023 - 2027	IRRI	Indian Council of Agricultural Research	75
A Regional Emergency Response Plan to Control the Banana Bunchy Top Disease (BBTD) Outbreak in East Africa	IITA	United States Department of Agriculture	67

Securing initial designated investments

To ensure the successful launch and delivery of Digital Transformation, substantial **designated pooled and bilateral investments** will be critical. Initial designated funding is being explored with:

- **BMGF**, with a possible $7–10 million designated specifically for the Accelerator across its four Areas of Work.
- **The United Arab Emirates (UAE)**, $5 million a year directed primarily toward funding CGIAR's **AI Accelerator Hub** to be hosted at the ATRC to accelerate AI innovation and train the open-source **Falcon LLM**.
- **Google.org**: Advanced discussions are underway to secure a single investment of **$10 million from Google.org**, which would provide significant support for building and scaling the Accelerator's AI and machine learning operations efforts.

These investments will form the backbone of the Accelerator's funding in its early stages, ensuring it has the resources to build out its four main Areas of Work and achieve its ambitious targets.

Preliminary budget scenarios and Areas of Work allocation

The Accelerator's initial funding requirement is estimated at **USD 25–30M per year** for the first three years, with investments spread across four main Areas of Work.

In the final version, a table will be inserted here, showing the breakdown of pooled funding by Area of Work for different budget scenarios.

This budget demonstrates the need for significant investment, particularly in developing the data ecosystem and AI-enabled tools, which are essential for delivering on the Accelerator's ambitious goals.

Long-term funding strategy

Over the six-year lifespan of the Digital Transformation Accelerator, the **funding mix will evolve** as new sources of funding are unlocked. A diversified and dynamic funding strategy will ensure this Accelerator's long-term sustainability, enabling it to continue growing and innovating in an ever-changing technological landscape.

In addition to securing continued pooled and bilateral investments, the Accelerator will seek to attract new partners, including:

- **Private sector companies** interested in co-developing AI solutions and digital tools for agriculture.
- **Philanthropic organizations** committed to advancing digital transformation in global FLW systems.
- **Government and multilateral institutions** offering support for infrastructure, governance, and capacity-building initiatives.

Digital Transformation represents an ambitious leap forward in leveraging cutting-edge technology to drive transformational change in food, water, and land systems. By combining a strategic mix of pooled and bilateral funding, the Accelerator will be able to deliver on its bold vision while continuing to unlock new resources and partnerships over its six-year duration. With early commitments from BMGF, UAE, and Google.org, the Accelerator is well-positioned to succeed, but further investments will be crucial to realizing its full potential.

Annex- Pooled funding

Leveraging pooled funding for new activities in 2025

With the [baseline] and [surge] budget scenarios for 2025, Digital Transformation will primarily focus on laying the foundation of two Areas of Work.

- **AoW1 Data Ecosystem** will undertake foundational activities to enable stakeholders, both CGIAR-internal and external partners, to generate open, FAIR, and AI-ready data. Activities will focus on improving the interoperability of both existing data (e.g., enhancing metadata) and new data (e.g., tools for collecting interoperable data).
- **AoW4 Enabling Environment** will establish the Network of Digital Innovation Hubs, starting with the AI Hub in UAE and the regional Hubs hosted at CGIAR Centers. The Hubs will launch a series of activities to stimulate innovation processes that support local digital innovation communities through convening and capacity sharing programs.

Research and innovation continuity

Digital Innovation is the only Initiative primarily mapped to the Digital Transformation Accelerator. During the Accelerator proposal development process, Digital Innovation proposed 20 priority use cases (Table 9). These use cases were collectively reviewed by the Writing Team and considered to have a high level of potential to accelerate research and innovation in Programs, closely aligning with the Digital Transformation TOC. A number of the use cases have already developed complementary bilateral funding sources, which are anticipated to continue under Digital Transformation.

Table 9: Research and innovation use cases proposed by Digital Innovation to continue under the Digital Transformation Accelerator

Title	Description
AI Farm Radio	Localizing radio-based extension using AI
AI for Rice Crop Manager	Enhanced soil nutrition management advisories using AI
AI for Pest-Disease Diagnosis	Computer vision (CV)-based pest and disease advisory
AI-enabled Agro-Met Advisory Automation	LLM-based automation of agro-met advisory
Generative AI for Farmer Advisories	LLM-based advisories using CGIAR research
Digital Twin for Water Management	Basin-level decision support system
Digital Twin for Livestock	Wearable sensors for analyzing livestock health and advisory
Statistics from Space	Remote sensing-based crop production monitoring and analytics
Enviro-Champ Citizen Science Program	CV-based biomonitoring of water quality
Intelligent Systems Advisory Tool (ISAT)	Location and context-specific farm advisories
Digital Ag Plot	In-situ monitoring of farm plots for research and capacity building
ICTforAg	Annual conference for global digital agriculture community
Learning Network	Online platform for collaboration and capacity sharing
Responsible Digital Innovation Collaborative	Facilitating South-South collaborative innovation partnerships
Design for Digital Inclusion	Incorporating human-centered design in digital tools
Multidimensional Digital Inclusiveness Index	Assessing the digital divides and strategies to bridge them
AgroTutor Academy	WhatsApp-based training courses provided in local languages
Digital Public Infrastructure	Research on publicly-funded digital infrastructure in agriculture
Digital Platform for Soil Health Monitoring	Scaling dry chemistry-based soil monitoring using AI
High-Frequency Food Systems Data	Crowdsourcing diet and market data to monitor and analyze hidden layers of food systems.