Digital Agriculture Roadmap Playbook

2025

FoodSystems 2030

WORLD BANK GROUP

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Purpose of this Digital Agriculture Roadmap (DAR) Playbook document

What is a DAR?

A **Digital Agriculture Roadmap (DAR) is a strategy, investment, and implementation plan** for a country or region to guide **transformation of its agriculture sector using digital technologies**.

What is this document?

This document is intended to be a **reference guide and toolkit for DAR development**, and draws on expert insights, stakeholder consultations, and real-world experiences developing DARs and other digital agriculture strategies and supporting digital ag financing and solutions globally. This document is a knowledge product of the World Bank (WB), developed in partnership with the Gates Foundation (Gf) and Boston Consulting Group (BCG) in 2025.

Who is it for?

This Playbook is primarily intended for practitioners seeking to develop DARs and digital agriculture strategies, in support of governments, funders, development partners, and the private sector. The content in this Playbook can also be used to explain DARs to policy makers, funders, and other key stakeholders.

How to use it?

Users can utilize this Playbook to understand the purpose and benefits of a DAR approach, methods and tools for how to develop and implement a DAR, and learnings and case studies from past DAR experiences. The document includes step-by-step guidance, examples, and resources / tools. The World Bank plans to update this Playbook regularly as the digital agriculture space continues to evolve.

Executive summary

What is digital agriculture?

The **use of technology and integrated systems** to enable **farmers and stakeholders** across the agricultural value chain

Example digital agriculture solutions[1]:
- **Advisory and information:** AI-based advisory services and farmer chatbots
- **Market linkages and access:** Digital marketplaces for inputs and offtake
- **Supply chain management:** Value chain traceablility systems
- **Enterprise management efficiency:** Smart irrigation, farm management services
- **Financial access:** Peer-to-peer lending tools, digital wallets
- **Enterprise R&D:** Seed / genome editing platforms

1. State of the Digital Agriculture Sector (Beanstalk); 2. Digital advisory, financial services, and market linkage;
3. LMICs: Low- and middle-income countries

Why is it important?

Digital solutions can **address key agricultural challenges** impacting farmers and livestock keepers

Digital approaches can support transformation of the ag sector, yielding positive impacts such as:
- Strengthened food security and climate resilience
- Increased farmer income and livelihoods
- Expanded financial access and inclusivity
- Economic growth and opportunity, jobs

Example impacts of digital ag solutions:[1,2]
- 23-73% yield improvements
- 18-37% income improvements
- 168% and 57% yield and income improvements with bundled digital ag solutions
- ~$450B annually in LMICs by 2033 in a thriving digital ag state with 64M women having access[3]

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Challenges | Despite positive impact, digital agriculture solutions have yet to reach their full potential, particularly in LMICs

Challenges to digital agriculture…
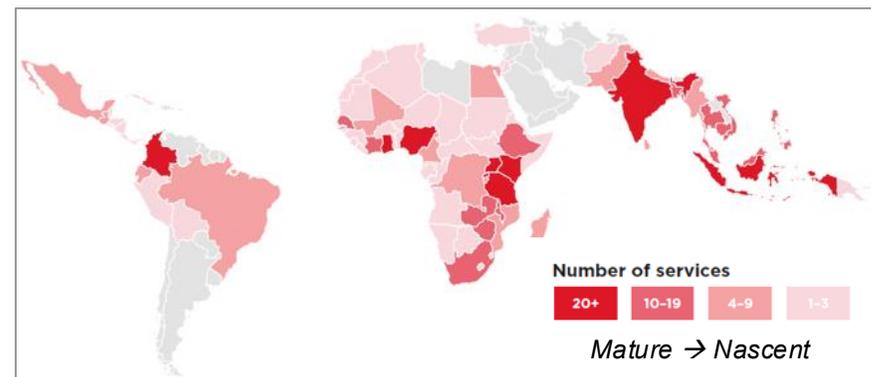
Challenges limiting digital ag solutions:

- Limited digital and physical infrastructure
- Low digital literacy, skilling methods & language barriers
- Inadequate financing for solutions
- Regulatory and policy gaps
- Data quality and data sharing challenges
- Constraints for private sector engagement
- Difficulty demonstrating value of digital to farmers

Challenges limiting coordination and scaling:

- Lack of clarity on a country's needs, priorities and opportunities for partners, funders and the private sector
- Multiple small, fragmented initiatives
- Limited stakeholder coordination across the ecosystem, resulting in sub-scale and sometimes duplicative efforts

…have resulted in limited adoption and scaling

- >150 million smallholder farmers in developing countries do not have access to digital services[1]
- Digital solution growth slowed from 33% in 2012-18 to 9% in 2018-22[2]
- <10% of potential end-users in LMICs use digital ag tools[2]
- LMICs have low prevalence of active digital ag services (see below)[3]

Number of services

| 20+ | 10-19 | 4-9 | 1-3 |

Mature → Nascent

1. Digital agriculture to enable adaptation (CGIAR, 2021); 2. State of the Digital Agriculture Sector (Beanstalk); 3. GSMA Digital Agriculture Maps 2020 State of the Sector in LMICs

Digital Agriculture Roadmap (DAR) Playbook

What is a Digital Agriculture Roadmap (DAR)?

A Digital Agriculture Roadmap (DAR) is a **strategy, investment, and implementation plan** for a country or region, intended to guide transformation of the agriculture sector using digital technologies

It outlines the country's:

- Digital agriculture context and needs
- Vision and goals
- Priority focus areas and use cases
- Specific, fundable initiatives
- Plan to deliver

DAR priorities guide the strategies, action plans, and investment decisions of key stakeholders, **overcoming critical challenges in digital agriculture adoption** and **unlocking productivity and profitability**

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History | The DAR approach has been developed / refined over the last 3+ years by the World Bank and Gates Foundation

2020	2022	2023	2024	2025

Digital Farmer Services Systems Analysis & Investment Design (SAID) framework (2020)
- Built a digital agriculture ecosystem map & 4 stage maturity model
- Assessed the digital ecosystem of Ethiopia and 13 other geographies

Ethiopia Digital Ag Extension & Advisory Services Roadmap (2022)
- Created a roadmap focused on digitally transforming extension and advisory
- Identified 30 initiatives across the digital agriculture ecosystem

Digital Ag Situation Assessments in Nigeria and Kenya (2023)

Odisha, India DAR (2023)
- Developed roadmap and "Big Plays" with implementation and digital adoption scale-up plans and investment packages

Ethiopia DAR development (2024)
- Developed a digital agriculture roadmap encompassing the entire value chain to crowd-in investment into high impact initiatives

Ethiopia DAR implementation implementation (2025)
- Establishing a Project Management Unit (PMU) and implementing DAR initiatives

Kenya DAR (2025)
- Developing a DAR in Kenya (in progress)

Also incorporates similar efforts from other actors in the ecosystem, e.g.,

FAO E-agriculture strategy guide (2016) (link)	FAO: State of Digital Ag in 47 SSA countries (2022) (link)	USAID FTF Digital Agriculture Ecosystem Assessments	IFAD Digital Ag Assessment Toolkit (2024) (link)

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Digital Agriculture Roadmap (DAR) Playbook

How DAR is different | The DAR drives value by providing a cohesive, actionable, and investment-ready plan driven by the government

Builds upon existing strategies and coordinates collective action under a shared national vision: Articulates a clear vision and priorities, building upon national goals and policies, thus shaping strategies and investments across the ecosystem, reducing fragmentation and duplication, and driving collective action.

Use-case driven ('front to back'): Prioritizes use cases with the greatest potential impact, grounded in the country's current maturity and ecosystem, then prioritizes initiatives across the digital stack and enabling environment needed to achieve the use cases.

Translates priorities into an investment plan: Provides the business case for investment in specific initiatives, thus guiding funders, investors, and the private sector on where to channel resources for maximum impact and scale and helping to crowd-in investment across the ecosystem.
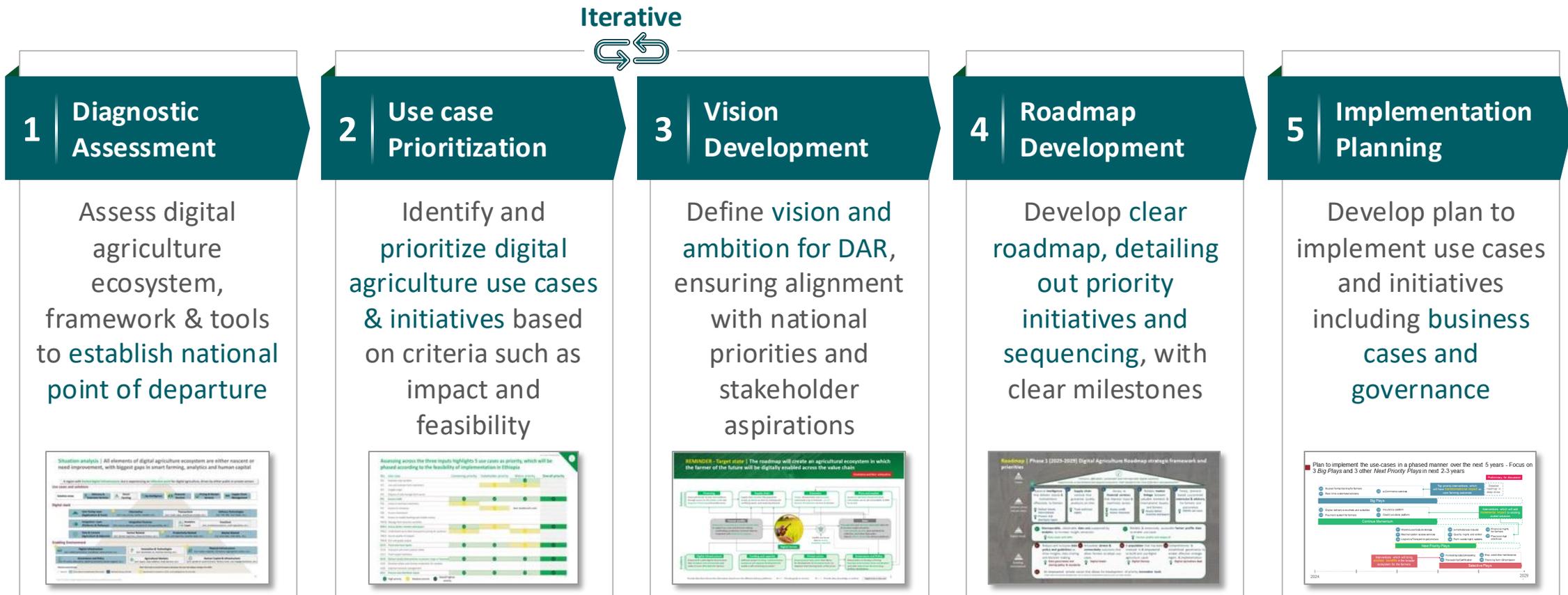
Lays foundation for in-country governance and delivery: The DAR goes beyond a typical strategy document to serve as the nation's or region's official plan and structure for advancing digital agriculture. The DAR process is intended to foster government ownership and / or sponsorship and set up the go-forward governance structure and mechanisms for DAR implementation.

Drives positive impacts in countries on food and economic security: By facilitating digital agriculture adoption, the DAR drives long-term benefits such as improved productivity and farmer income, which ultimately strengthen food security and food systems resilience and increase economic growth and financial inclusivity.

Example of emerging impacts: The Ethiopia DAR, launched in 2025, is projected to reach 30M farmers, increase farmer income 8% after 5 years, and unlock US$90M for digital agriculture. Within a few months of its launch, the DAR has already attracted interest from various donors that are using the DAR to guide their investments.

Digital Agriculture Roadmap (DAR) Playbook

Approach | Five key steps to develop a Digital Agriculture Roadmap (DAR)

Iterative

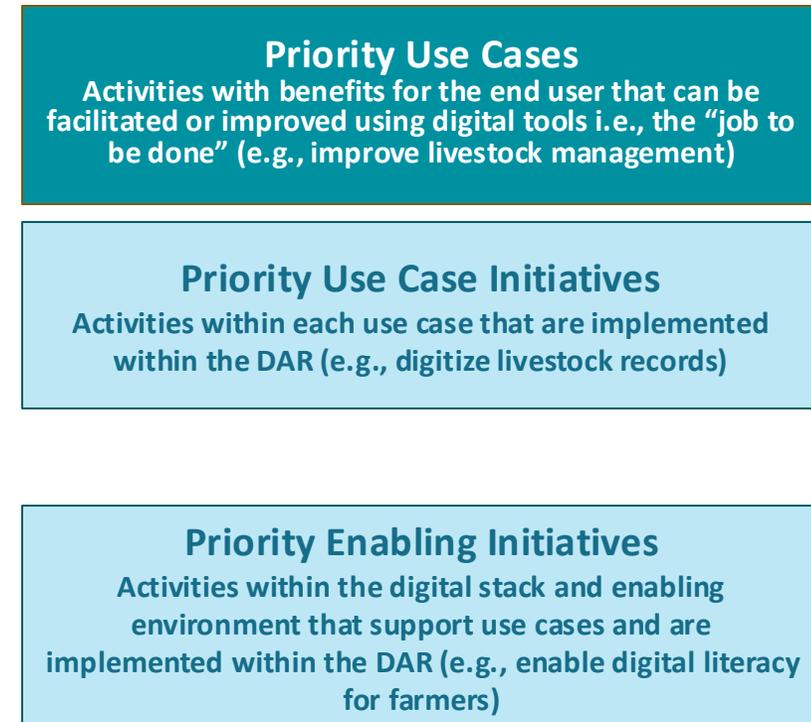| 1 **Diagnostic Assessment**	2 **Use case Prioritization**	3 **Vision Development**	4 **Roadmap Development**	5 **Implementation Planning**
Assess digital agriculture ecosystem, framework & tools to establish national point of departure	Identify and prioritize digital agriculture use cases & initiatives based on criteria such as impact and feasibility	Define vision and ambition for DAR, ensuring alignment with national priorities and stakeholder aspirations	Develop clear roadmap, detailing out priority initiatives and sequencing, with clear milestones	Develop plan to implement use cases and initiatives including business cases and governance

Early and ongoing stakeholder engagement with government sponsors, funders, and others to ensure alignment and effectiveness

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Framework | A typical DAR framework lays out the vision and prioritized use cases, initiatives, and enablers to achieve that vision

The DAR leverages a strategic framework…

…to inform priority use cases and initiatives

Vision
Overall ambition of the Digital Agriculture Roadmap

Use case areas
Categorization of different use cases (e.g., smart farming, financial services)

Digital stack
Key digital elements required for digital ag across the user facing layer (applications, tools), integration layer (platforms, pathways), and data & content (agriculture, adjacent)

Enabling environment
Key enablers required for digital agriculture including government and policy, human capital, technologies agriculture markets, and digital and physical infrastructure

Priority Use Cases
Activities with benefits for the end user that can be facilitated or improved using digital tools i.e., the "job to be done" (e.g., improve livestock management)

Priority Use Case Initiatives
Activities within each use case that are implemented within the DAR (e.g., digitize livestock records)

Priority Enabling Initiatives
Activities within the digital stack and enabling environment that support use cases and are implemented within the DAR (e.g., enable digital literacy for farmers)

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Lessons learned from previous DAR experience

Scope and prioritize appropriately

Given the breadth of digital agriculture, DAR should be scoped along key dimensions such as geographic or value chain coverage to ensure it is impactful and investable

Tailor to the country context

Understanding a country's starting point is important to ensure alignment with national priorities, adjust for the country's context, and build effectively from existing strategies

Adopt a use-case driven approach ("front to back")

"Front to back" approach starts with the problems that must be solved, to ensure prioritization of efforts that drive greatest impact and value

Engage stakeholders early and frequently

Stakeholder engagement is critical including using convenings to build momentum and alignment, and strongly engaging the private sector

Engage funders early

Funder engagement is crucial to secure early buy-in and commitments toward implementation

Ensure government ownership

Government will, technical capacity, and ownership are essential to anchor the DAR in national priorities, drive cross-sector coordination, and ensure sustainable implementation

Digital Agriculture Roadmap (DAR) Playbook

A call to action to policymakers and funders

The **DAR approach has the potential to become the gold standard for developing, funding, and implementing digital agriculture strategies** in LMICs.

Policymakers and funders play a key role in enabling countries to realize the benefits of the DAR approach, including:

- **Developing and institutionalizing DARs** within national and regional agriculture, digital, and economic development plans, in a manner that addresses critical country needs and engages and empowers the full ecosystem

- **Mobilizing funds for implementation**, by allocating domestic budgets where possible and unlocking funding from a diverse set of actors, including donors, philanthropies, and the private sector

- **Coordinating across the ecosystem** to maximize resource efficiency and effectiveness and avoid fragmentation or duplication of efforts

- **Ensure strong ownership and institutional capacity** to lead planning and implementation, including investing in digital skills development

Chapter 1: Introduction

Introduction | What is digital agriculture and why is it important?

What is digital agriculture?

Agricultural transformation is a global priority but is difficult to achieve, especially in low- and middle-income countries (LMICs). Systemic barriers leave millions of farmers and pastoralists vulnerable. Productivity is low, with many regions needing to double or triple output to meet demand. Climate change worsens the challenge, and gender inequalities persist. Smallholder farmers, the backbone of agriculture in LMICs, face limited market access, financial services, and infrastructure.

Digital agriculture is the use of **digital technology and integrated systems to equip farmers and stakeholders with timely information, tools, and services across the agricultural value chain.** Examples include[1]:

- **Advisory & information:** Real-time information and recommendations, such as AI-based advisory for agronomic practices
- **Market linkages & access:** Platforms connecting farmers to buyers, markets, and solution providers, such as digital marketplaces
- **Supply chain management:** Tools to manage goods, services, and information such as value chain traceability systems
- **Enterprise management efficiency:** Tools enhancing farm and business operations and management such as smart irrigation
- **Financial access:** Financial services & risk management tools like peer-to-peer lending
- **Enterprise R&D:** Products and services such as seed editing digital platforms

Why is digital agriculture important?

Digital approaches are vital for addressing agricultural challenges, enabling more cost-effective and efficient delivery of information and services, optimizing resources, improving financial access, strengthening market links, and supporting better decisions through data and analytics. Embedding digital in agriculture is critical for long-term competitiveness and sustainability in the sector, helping to build economic resilience, address structural challenges in food systems, and engage the next generation.

Digital approaches can unlock massive scale and localization at significantly lower costs, yielding positive impacts such as:

- **Strengthened food security and resilience of food systems** including climate resilience
- **Increased farmer income and economic growth**, through boosts in productivity, efficiency and yields
- **Expanded financial inclusion and inclusivity**, through equitable access to information, finance, and markets

By some estimates, smallholder farmers using digital advisory services, market linkages and financial services see yield improvements of 23-73% and income improvements of 18-37%. Bundled digital ag solutions could drive even greater impacts with yield and income improvements of 168% and 57%, respectively.[1] Achieving a "thriving" versus "derailed" state of digital agriculture use could equate to ~US$450 billion of value annually across LMICs by 2033 with 64 million women having access to digital ag solutions.[2]

Examples of impact | Digital agriculture solutions can significantly improve farmer outcomes

Ama Krushi
Precision Development (PxD)
Odisha, India

Context

Many smallholder farmers in India lack access to reliable, timely, and localized agricultural advisory services, making it difficult for farmers to receive real-time guidance

Solution

Ama Krushi[1] is an Interactive Voice Response System designed to deliver personalized, location-specific agricultural advisory content to farmers, alongside other advisory services

Impact

PxD reports impacts of its services:[2]
- 9% increase in harvest in areas with excess rainfall
- Higher incomes of US$30-48
- Cost-benefit ratio of $1:$9-15 in agricultural profits
- Reaching ~18M farmers at a cost of $1 / farmer / year

Farmer.Chat
Digital Green
Africa, Asia

Smallholder farmers in Africa and Asia are often hampered by the lack of access to timely and localized agricultural advisory services, limiting their ability to adopt best practices and improve productivity

Farmer.Chat is an AI-powered assistant that delivers on-time, localized, climate-smart advisories to farmers through support of government-supported public extension systems

Digital Green reports impact across its AI-enabled solutions:[3]
- Up to 17% increase in crop yields
- Up to 24% increase in farmer incomes
- Reduced the cost per farmer from $35-3.5 for conventional to AI-enabled extension

iCow
Green Dreams Tech, Safaricom, ILRI
Kenya

Smallholder farmers often have challenges in accessing timely and reliable agricultural information, and this limits them from realizing maximum farm output

iCow is a mobile-based platform that delivers localized advisory services, market access, and digital tools like livestock calendars and weekly SMS tips to improve smallholder farmer prosperity

iCow reports impact across its suite of services and tools:[4]
- 22% increase in household income
- Reaching 1.6M farmers in Kenya including 480K women

Source: Precision Development, Digital Green, and Arifu websites; 1. Under government ownership, the name of Ama Krushi has been changed to Krushi Samruddhi; 2. Ama Krushi website; Odisha RCT; 3. Digital Green website; Farmer.Chat website; 3. CGIAR Platform for Big Data in Agriculture iCow

Digital Agriculture Roadmap (DAR) Playbook

Challenges | Digital ag faces many challenges which limit adoption and scaling
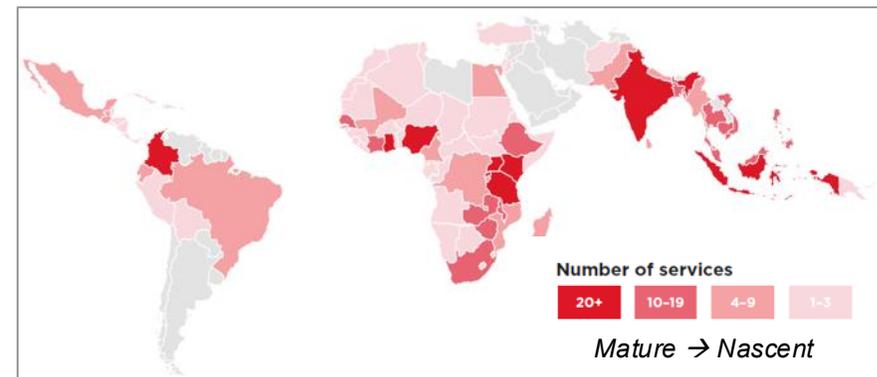
While digital solutions have demonstrated positive impact, they have yet to reach their full potential. Several systemic challenges hinder widespread adoption, and drive a "digital divide" between smallholder farmers and large farms due to disparities in access to digital technologies, knowledge, and skills, and in the enabling environment:

- **Limited digital infrastructure**, including limited affordability and usage of broadband networks

- **Limited physical infrastructure**, such as unreliable electricity and road and transport infrastructure that restricts market access

- **Low digital literacy & skilling mechanisms** and language barriers

- **Inadequate funding to scale proven solutions** with smallholder farmers often unable to afford smartphones, data plans, and digital subscriptions, while agribusinesses and digital service providers face high investment risks and uncertain returns, limiting the expansion of digital agriculture solutions

- **Regulatory and policy gaps,** including unclear data governance laws

- **Data challenges** like poor availability, quality, and shareability, and concerns around privacy and data protection

- **Constraints for private sector engagement,** such as uncertainty in regulations or low farmer purchasing power

- **Difficulty demonstrating value of digital solutions to farmers,** as many remain uncertain about benefits relative to the cost of access

Beyond these direct barriers, many countries lack a clear coordinated national digital agriculture strategy, investment and implementation plan:

- Many countries **lack clarity on their priorities, needs, and opportunities for digital agriculture**, making it difficult for governments, development partners, and investors to align efforts

- The sector is often characterized by **multiple fragmented initiatives** that operate in silos, leading to inefficiencies and duplication of efforts

- Additionally, **limited stakeholder coordination** across the digital agriculture ecosystem makes it difficult to scale solutions effectively

As a result of these challenges, digital agriculture solutions in LMICs have experienced limited uptake, with over 150 million smallholder farmers in developing countries not having access to digital services,[1] digital solution growth having slowed from 33% in 2012-18 to 9% in 2018-22,[2] only 10% of potential end-users in LMICs using digital ag tools[2] and LMICs having low prevalence of active digital ag services (see below).[3]

Number of services

| 20+ | 10-19 | 4-9 | 1-3 |

Mature → Nascent

Source: What's Cooking: Digital Transformation of the Agrifood System (World Bank Group)
1. Digital agriculture to enable adaptation (CGIAR, 2021); 2. State of the Digital Agriculture Sector (Beanstalk); 3. GSMA Digital Agriculture Maps 2020 State of the Sector in LMICs

Digital Agriculture Roadmap (DAR) Playbook

Definition | What is a Digital Agriculture Roadmap (DAR)?

A DAR is a country-owned **strategy, investment and implementation plan** that guides transformation of the agriculture sector using digital technologies. Developed by national or regional governments – often with support from development partners – a DAR sets out a holistic national agenda of digital agriculture priorities, unifying the ecosystem under a shared vision. More than a traditional agriculture strategy document, it is a participatory process that engages government and key stakeholders in defining priorities, financeable initiatives, and a clear implementation plan to deliver high impact solutions in areas such as advisory and extension services, smart farming, financial services, pricing and market services, supply chain management, and ag intelligence, as well as solutions across the digital stack and enabling environment. The DAR builds on existing strategies and past efforts, integrating them into a unified set of priorities that guide the strategies, action plans, and investment decisions of key stakeholders, thus overcoming critical challenges in digital agriculture adoption and unlock productivity and profitability.

National and other existing strategies related to digital and agriculture

Digital agriculture plans and priorities across the ecosystem of actors

National agriculture strategy

National digital strategies (e.g., ICT, AI, data governance, digital skills, entrepreneurship / MSMEs)

Existing digital and / or agriculture assessments

Digital Agriculture Roadmap (DAR)

Government implementation plans

Funder investment plans

Development partner plans

Private sector plans

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Framework | Structure of the DAR strategic framework

The DAR leverages a strategic framework…

Vision
Overall ambition of the Digital Agriculture Roadmap

Use case areas
Categorization of different use cases (e.g., smart farming, financial services)

Digital stack
Key digital elements for digital ag across the user facing layer (applications, tools), integration layer (platforms, pathways), and data & content (agriculture, adjacent)

Enabling environment
Key enablers for digital agriculture including government and policy, human capital, technologies agriculture markets, and digital and physical infrastructure

… to inform priority use cases and initiatives

Priority Use Cases
Activities with benefits for end users that can be facilitated or improved using digital i.e., the "job to be done" (e.g., improve livestock management)

Priority Use Case Initiatives
Activities for each use case that are implemented within the DAR (e.g., digitize livestock records)

Priority Enabling Initiatives
Digital stack and enabling environment activities that support use cases and are implemented within the DAR (e.g., enable digital literacy for farmers)

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Digital Agriculture Roadmap (DAR) Playbook

Value | How does a DAR drive value?

Many digital agriculture assessments and strategies exist in countries, which are highly useful for understanding a country's starting point and high-level national priorities. However, the DAR goes further by offering a cohesive, actionable, and investment-ready plan and government-led process with several value-add elements that distinguish it from typical diagnostics and agriculture strategies.

Builds upon existing strategies and coordinates collective action under a shared national vision: The DAR draws on national priorities, policies, and ongoing digital agriculture initiatives to create a unified, cohesive plan. It articulates a shared national vision and engages diverse stakeholders, enabling the ecosystem including funders, development partners and the private sector to align their efforts with established national goals – reducing fragmentation and duplication and driving collective action.

Use-case driven ('front to back'): Beyond the high-level priorities often set forth in other national strategies, the DAR prioritizes use cases that are most impactful for farmers and pastoralists and then defines specific initiatives across the digital stack and enabling environment needed to achieve those use cases. This ensures that the appropriate digital agriculture architecture is built to deliver in the highest priority areas.

Translates priorities into an actionable investment and implementation plan: The DAR provides a compelling business case for investment in specific high ROI initiatives, which provides clear guidance to donors, financiers, and the broader ecosystem of actors on where to channel resources for maximal impact. This structured, investment-ready approach helps crowd-in investment and enables establishment of multi-actor consortia around critical solution areas. For example, the World Bank now plans to align its future programming and funding with priorities established in Ethiopia's DAR, and is establishing multi-funder partnerships around critical enablers such as DPI and AI.

Lays the foundation for in-country governance and delivery: The DAR goes beyond a typical strategy document to serve as the nation's or region's official plan and structure for advancing digital agriculture. The DAR process is intended to foster government ownership and / or sponsorship and set up the go-forward governance structure and mechanisms for DAR implementation.

Drives positive impacts in countries on food and economic security: By facilitating digital agriculture adoption, the DAR drives long-term benefits such as improved productivity and farmer income, which ultimately strengthens food security and resilience of food systems and increases economic growth and financial inclusivity.

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Digital Agriculture Roadmap (DAR) Playbook

Case study | Ethiopia's Digital Agriculture Roadmap 2025-2032

DAR 2025-2032 aims to revolutionize Ethiopia's agricultural sector by integrating digital solutions across the entire value chain

Process

Ecosystem diagnosis

Performed a thorough assessment of Ethiopia's digital agriculture ecosystem to establish the national point of departure for the DAR

DAR development

Created the Digital Agriculture Roadmap 2032, which outlines Ethiopia's vision and priority initiatives across the digital stack and enabling environment to support digital agriculture transformation

Implementation planning

Developed an implementation plan for the DAR including detailed business cases, initiative charters, and governance to coordinate implementation

Funding & implementation

Now supporting DAR funding and implementation, including mobilizing "funder's circles" and implementing Phase 1 (2025-2029) to build the foundation for key initiatives that empower farmers

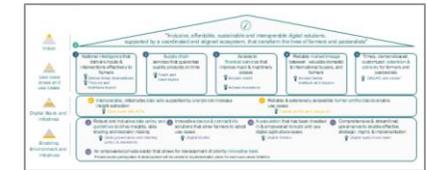## Ethiopia's Digital Agriculture Roadmap 2032

Impact so far

- Officially adopted by the Ethiopia government
- Initiatives projected to reach 30M farmers, increase farmer income 8% after 5 years, and unlock US$90M for digital agriculture
- 150+ actors engaged through funder & partner circles including 25+ donors & 50+ private sector companies
- Stimulating investment from donors, including ongoing discussions with ~20 funders to invest in specific initiatives (e.g., data infrastructure)
- Guiding donors' future portfolios of investments in Ethiopia on programs related to digital and ag
- Agreement and preparations to stand up a Digital Ag Unit within the Ministry of Agriculture (MoA) to oversee / coordinate implementation

Note: Effort was supported by the Ministry of Agriculture Ethiopia, Ethiopian ATI, Gates Foundation, World Bank, Boston Consulting Group, and Precision Development

Digital Agriculture Roadmap (DAR) Playbook

History | This playbook formalizes and builds on past digital agriculture roadmap and landscape approaches

The World Bank and Gates Foundation have supported several major digital agriculture strategies over the past five years, evolving from early assessments of digital ecosystems to recent, full DARs. These have built upon numerous efforts across the ecosystem, including strategic planning guides and toolkits.

2020	2022	2023	2024	2025
Gf Digital Farmer Services Systems Analysis & Investment Design framework (2020) • Built a digital agriculture ecosystem map & 4 stage maturity model • Assessed the digital ecosystem of Ethiopia and 13 other geographies	**Ethiopia Digital Ag Extension & Advisory Services Roadmap (2022)** • Created a roadmap focused on digitally transforming extension and advisory • Identified 30 initiatives across the digital agriculture ecosystem	**Digital Ag Situation Assessments in Nigeria and Kenya (2023)** **Odisha, India DAR (2023)** • Developed roadmap and "Big Plays" with implementation and digital adoption scale-up plans and investment packages	**Ethiopia DAR development (2024)** • Developed a digital agriculture roadmap encompassing the entire value chain to crowd-in investment into high impact initiatives	**Ethiopia DAR implementation implementation (2025)** • Establishing a PMU and implementing DAR initiatives **Kenya DAR (2025)** • Developing a DAR in Kenya

Also incorporates similar efforts from other actors in the ecosystem, e.g.,

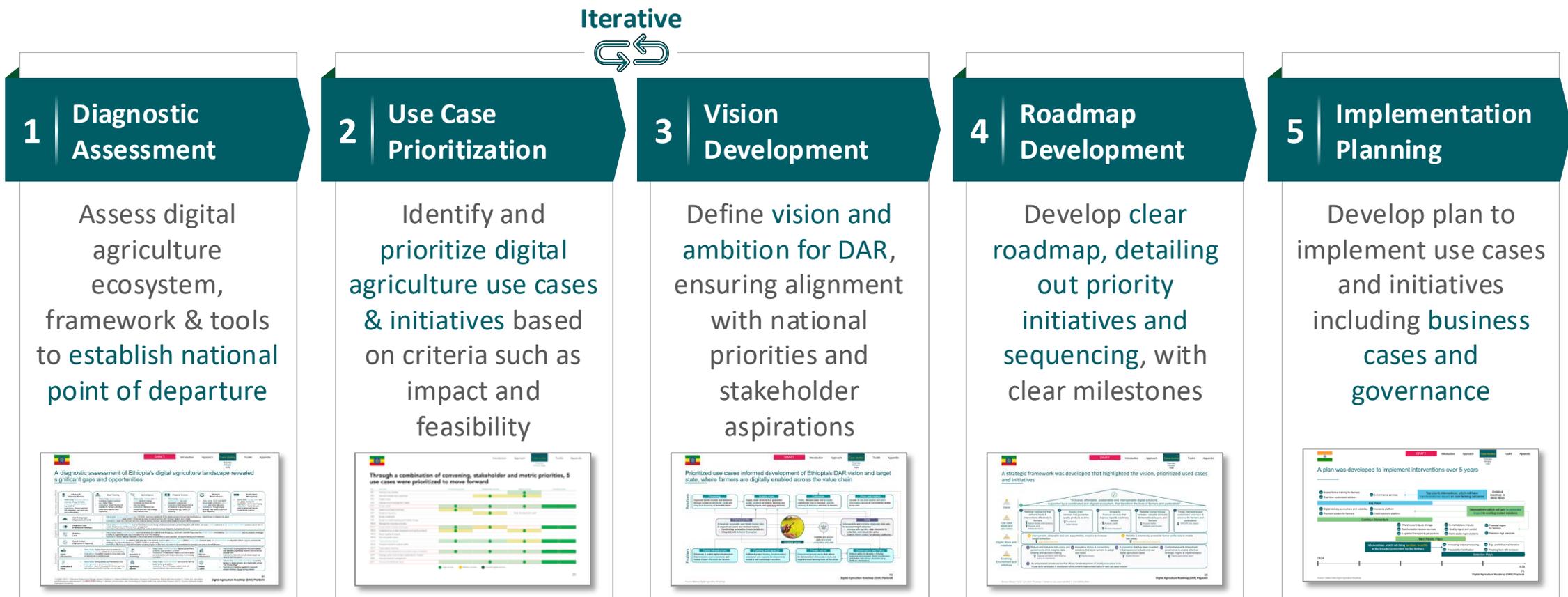| **FAO E-agriculture strategy guide (2016) (link)**	**FAO: State of Digital Ag in 47 SSA countries (2022) (link)**	**USAID FTF Digital Agriculture Ecosystem Assessments**	**IFAD Digital Ag Assessment Toolkit (2024) (link)**

Digital Agriculture Roadmap (DAR) Playbook

Chapter 2: Guide to DAR approach

Overview | 5 key steps to develop a Digital Agriculture Roadmap

Iterative

1 Diagnostic Assessment	2 Use Case Prioritization	3 Vision Development	4 Roadmap Development	5 Implementation Planning
Assess digital agriculture ecosystem, framework & tools to establish national point of departure	Identify and prioritize digital agriculture use cases & initiatives based on criteria such as impact and feasibility	Define vision and ambition for DAR, ensuring alignment with national priorities and stakeholder aspirations	Develop clear roadmap, detailing out priority initiatives and sequencing, with clear milestones	Develop plan to implement use cases and initiatives including business cases and governance

Early and ongoing stakeholder engagement with government sponsors, funders, and others to ensure alignment and effectiveness

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Diagnostic assessment

1. Diagnostic assessment

Objective

The objective of this step is to assess the current digital agriculture landscape to pinpoint gaps, opportunities, and overall maturity. The diagnostic should highlight where digital solutions can create the most impact and guide prioritization / sequencing of use cases & initiatives.

Selected resources

- National documents (agriculture, digital, digital agriculture policies / strategies)
- Market intelligence reports (e.g., AgBase, Mercy Corps)
- Beanstalk: State of the Digital Agriculture Sector Across Agricultural LMICs
- FAO: Status of Digital Ag in 47 SSA countries
- GSMA: Digital Ag Maps
- SAID digital ag ecosystem map

Approach

A four-step approach can be used to assess the digital agriculture ecosystem, leveraging desk research, expert and stakeholder insights, and farmer surveys or focus groups to get direct feedback from users.

Tip: If a digital ag ecosystem assessment already exists, a lighter touch approach can be taken, summarizing available information. If not, a full diagnostic exercise is most helpful.

1A. Assess agriculture landscape: Understand key elements of the agriculture landscape including existing national strategies and policies (e.g., major subsectors) and challenges and opportunities (e.g., productivity gaps, value chain inefficiencies).

1B. Map digital agriculture ecosystem: Map the digital agriculture ecosystem, including priorities of the country and major players (e.g., solution providers, funders):
- Assess existing national visions, including priorities, objectives, and timelines
- Define key use case areas where digital can be applied (e.g., advisory, smart farming, ag intelligence, financial services, market services, supply chain management)
- Map key solutions and initiatives across the digital stack, including user facing, integration, analytics, and data and content layers; and the enabling environment (e.g., policy and regulations, funding, digital and physical infrastructure, human capital)

1C. Determine ecosystem maturity: Evaluate the readiness of the ecosystem across use case areas, digital stack, and enabling environment. *See next page for further detail.*

1D. Assess implications: Based on diagnostic findings, identify gaps and opportunities where digital agriculture can have an impact, to inform use case prioritization.

Illustrative outputs / resources

SAID Framework for digital agriculture ecosystem mapping

Maturity assessment of digital ag ecosystem

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Digital Agriculture Roadmap (DAR) Playbook

Deep dive | 1C. Determine ecosystem maturity

Objective and approach

Determining ecosystem maturity is important for understanding the state of digital agriculture and informing use case prioritization and can be done through desk research or use of maturity models such as the SAID Maturity Model. To assess maturity, one can review digital, agriculture, and digital agriculture indicators along key dimensions such as:

- **Maturity of agriculture systems:** Overall development of the agricultural sector (e.g., productivity, tech adoption, supply chain)
- **Strength of digital infrastructure ecosystems:** Robustness of digital connectivity (e.g., mobile and internet penetration, infrastructure development), digital public infrastructure, and digital public goods
- **Private sector strength & innovation capacity:** Capacity to drive innovation (e.g., AgTech solutions, investment inflows, R&D)
- **Public sector & business enablement:** Government policies, regulatory frameworks, and institutional support (e.g., public sector performance, corruption index)
- **State of gender, digital, and financial inclusion:** Inclusivity (e.g., literacy rates, human capital development, women's participation)
- **Data ecosystem maturity:** Availability and usage of high-quality, localized data; potential for data exchange and integration; presence of data protection and privacy frameworks

For each dimension, one can consider key criteria such as:

- **Adoption**: Uptake by players (farmers, agribusinesses, governments)
- **Usage**: Frequency of use and effectiveness of digital solutions
- **Integration**: How well solutions integrate with existing practices
- **Scalability**: Potential for digital ag solutions to reach a broader use base
- **Penetration**: Level of digital technology use in the population

Based on the findings, assess the maturity of the ecosystem across use case areas, digital stack, and enabling environment, indicating where each element is nascent versus exists but needs strengthening or is not at scale versus strong and at scale.

Illustrative outputs / resources

SAID digital agriculture ecosystem maturity model

Digital Agriculture Roadmap (DAR) Playbook

Use case prioritization

2. Use Case Prioritization

Objective

The objective is to prioritize digital ag use cases based on criterial such as impact and feasibility.

A **use case** is a "job to be done" or an area where application of digital tools could benefit producers and other actors in the ag sector. Use cases can be categorized under use case areas such as ag intelligence, supply chain management, or financial services.

Systematically evaluating potential use cases ensures that the DAR prioritizes digital interventions with meaningful benefits.

This step can be iterative with vision development (Step 3).

Selected resources

- Use case prioritization matrix
- Use case library

Approach

A three-step approach can be used to prioritize use cases, leveraging analysis and expert and stakeholder insights.

2A. Identify potential use cases: Within each use case area defined in Step 1B (e.g., advisory, smart farming), identify a long list of potential use cases. Examples:
- **Advisory and extension:** Provide climate-smart advisory, deliver digital extension services
- **Supply chain management:** Track & trace input supply, track output inventory
- **Financial services:** Access to credit, lease or purchase machinery

Tip: The **use case examples** *in Resources provides a starting list of potential use cases that can be tested and prioritized with stakeholders. Additional sources of use cases may come from the diagnostic, stakeholder interviews/focus groups, and solution providers.*

2B. Prioritize use cases: Evaluate the long list of use cases to create a prioritized list, leveraging evaluation criteria such as impact (e.g., farmer coverage, impact on cost/income), digital readiness, feasibility, or scalability. *See next page for further detail.*

2C. Validate prioritization with stakeholders: Importantly, prioritized use cases should be validated and finalized with input from key stakeholders (e.g., country government, funders, development partners, cooperatives as a representative of farmers) to reflect country priorities. Consider use cases that are priorities in the short-term versus long-term (e.g., based on priorities or urgency).

Illustrative outputs / resources

Prioritized use cases based on convening, stakeholder & metrics

Use case and solution library with a long list of initiatives

Digital Agriculture Roadmap (DAR) Playbook

Deep dive | 2B. Prioritize use cases

Objective and approach

A structured approach to prioritization ensures that the DAR is focused, strategic, and enables coordination across the ecosystem, honing in on where to best focus efforts across value chains and sectors in a manner that is impactful, feasible, and aligned with the country's priorities. Without clear prioritization, efforts can occur in a fragmented manner and in silos, diluting impact and leading to inefficiencies.

To systematically prioritize use cases, **assess the long list of potential use cases against evaluation criteria** such as:
- **Impact**: Extent to which the use case improves farmer livelihoods, productivity, market access, or income
- **Feasibility**: Ease of implementation, considering existing infrastructure, policies, technical viability, and financial viability – considering use cases with known cost-effective solutions
- **Scalability**: Potential for the solution to expand to a broader user base or multiple regions
- **Digital Readiness**: Extent to which the necessary digital infrastructure, policies, and stakeholder capacity are in place to support implementation

Each use case can be ranked as low, medium, or high across these dimensions to provide a structured basis for decision-making, tailoring criteria to align with the **country's strategic focus**.

Leverage decision-support tools such as a prioritization matrix to visualize trade-offs between different use cases.

Illustrative outputs / resources

Prioritized use cases based on impact-readiness matrix

Near-term and longer-term use case priorities

Digital Agriculture Roadmap (DAR) Playbook

Vision development

3. Vision Development

Objective

The objective is to define the vision for the DAR as a clear, ambitious, and actionable direction for the country's digital agriculture transformation. This vision serves as a unifying goal that aligns stakeholders, policies, and initiatives toward a shared long-term outcome.

By establishing a vision, this step helps ensure that the DAR is strategically focused, and helps secure stakeholder buy-in.

This step can be iterative with use case prioritization (Step 2).

Selected resources

- National documents (agriculture, digital, digital agriculture policies / strategies)

Approach

A three-step approach can be used to develop the vision, leveraging desk research and key stakeholder inputs.

3A. Define vision for the DAR: If there is not already a clear vision in place, define the DAR vision for the country, creating a vision statement that sets the overall DAR ambition. The vision should be considered over a particular time frame (e.g., 10 years) and aligned with key priorities (e.g., national development objectives).

3B. Define specific goals: Beyond a vision statement, define specific, measurable goals that outline the target end state for digital enablement across the ecosystem such as:
- Financing: Improved farmer income through access to affordable credit
- Price & market: No-cost access to real-time market and price info across commodities
- *Note: Consider thematic priorities, such as climate resilience and gender inclusion*

Tip: Ideally, the vision and goals for the DAR align with and support existing agriculture and digital goals and strategies.

[Optional] 3C. Develop impact pathways (i.e., Theory of Change): It can be helpful to establish a results framework that maps causal pathways between activities across priority use cases and target outcomes at the initiative-, use case-, and overall DAR vision-level. While not always feasible to measure impact attributed to the DAR, this step provides a clear logic linking measurable actions to vision. *See next page for further detail.*

Importantly, the DAR vision should be co-created with key stakeholders including country representatives, industry leaders, and funders. This ensures that the vision aligns with national priorities, needs and opportunities. Stakeholder engagement can be done through large convenings, workshops, or individual consultations.

Illustrative outputs / resources

DAR vision statement

Goals across the agricultural ecosystem

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Deep dive | 3C. DAR Results Framework

When developing a DAR, it can be helpful to develop a results framework to ensure there is a logical link between the inputs and activities of DAR implementation and the outcomes of the DAR at the initiative level, use case level, and in achieving the overall DAR vision and goals. Such a framework can lay the groundwork for impact measurement by informing key performance indicators (KPIs) that should be used to assess impact at each level, and to provide clarity on how the impact of individual initiatives ultimately drive change in the country.

Illustrative results framework for DAR implementation

Inputs	Activities	Outcomes *(initiative level)*	Outcome *(use case level)*	Outcome *(overall)*
Resources used to implement DAR activities	DAR use case initiatives & across the digital stack and enabling environment	Immediate results from specific DAR initiatives	Intermediate results for the use case across all relevant initiatives	Longer-term results from all use cases in achieving the DAR vision and goals

E.g.:
- Funds mobilized
- Partnerships established
- Solution providers participating

Use case initiative activity e.g., develop and pilot credit assessment tools

Enabling initiative activity e.g., digitize payments through rural service points (user facing layer)

Initiative outcomes, e.g., increased farmer access to digital credit platforms

Use case outcomes, e.g., improved access to credit for agricultural inputs

Example outcomes:
- Improved productivity
- Increased farmer income
- Enhanced sustainability & climate resilience
- Increased food security

Example KPIs:[1]
- % growth in agricultural productivity per ha
- # beneficiaries with enhanced climate risk resilience
- # people with strengthened food & nutrition security

1. A more comprehensive list of KPIs can be sourced from the World Bank Group Scorecard (see World Bank Group Scorecard Dashboard and WB Group Scorecard FY24-FY30 Document)

Digital Agriculture Roadmap (DAR) Playbook

Roadmap development

4. Roadmap (Initiative) Development

Objective

The objective is to develop the roadmap as a structured and actionable plan that translates the vision and use cases into specific initiatives with clear sequencing, timelines and milestones.

By providing a clear strategic framework, the roadmap helps ensure alignment among stakeholders and clarity around the specific initiatives that must be financed and implemented.

Ultimately, the roadmap serves as a strategic guide to drive coordinated action and measurable progress toward the desired digital agricultural outcomes.

Approach

A three-step approach can be used to develop the roadmap, leveraging analysis and key stakeholder inputs.

4A. Identify specific initiatives: Identify key initiatives for each of the prioritized use cases and across the digital stack and enabling environment. This process can be iterative and stakeholder-driven, focusing on initiatives that are feasible to implement and aligned with stakeholder priorities.

4B. Develop DAR strategic framework: Develop a DAR strategic framework to serve as an overall guiding structure. This should include the Vision (from Step 3), the prioritized use cases across each use case area of focus (from Step 2), and initiatives (from Step 4A).

4C. Define sequencing, timelines and milestones: Define the sequencing, timeline, milestones and deliverables for implementation of the initiatives. Consider near-term (e.g., 2–4 years) "quick win" initiatives aligned with political decision-making cycles, and longer-term (e.g., 5-10 years) initiatives that strengthen the broader ecosystem. A phased approach ensures successful early adoption while laying the groundwork for transformative change over time.

Roadmap development should be coordinated with key stakeholders critical for implementation, including the roadmap "owners" (i.e., country representatives) and funding and implementation partners. Once developed, the roadmap should be packaged into a document that can be shared and socialized.

Illustrative outputs / resources

Strategic framework with a vision, prioritized use cases and initiatives

Identification of near and medium-term priority inititatives

Timeline for DAR phases (near-term and long-term) including sequencing for priority initiatives

Digital Agriculture Roadmap (DAR) Playbook

Implementation planning

5. Implementation Planning

Objective

The final objective is implementation planning to establish the necessary activities, structures, and mechanisms to ensure successful execution of the roadmap.

This step focuses on detailing key initiatives for prioritized use cases, developing business and investment cases, establishing governance structures, and designing monitoring and evaluation mechanisms.

Ultimately, implementation planning moves the roadmap from strategy to action, and lays the foundation for successful, long-term digital transformation in the country.

See page 37 for an illustrative implementation timeline.

Approach

A five-step approach can be used to develop the implementation and investment plan.

5A. Develop initiative charters: Create initiative charters for each prioritized use case, describing the initiatives, owners, implementation activities, and resourcing needed. Consider dependencies between use cases and initiatives.

5B. Develop business cases: Develop a business/investment case for each initiative. This includes potential impacts, revenues, and costs of the initiative, resulting in a financial or social ROI. The business case should assess the expected impact, such as improvements in productivity, profitability, or efficiency against the costs. To ensure feasibility, potential funding sources and strategic partners should be identified, strengthening the case for investment and long-term sustainability. See page 38 for financing strategies.
Tip: The intention is to make the case for investment from potential funders / financers for DAR initiatives. It may be helpful to first identify potential funders to tailor the business cases.

5C. Establish governance structures: Define governance structures and processes to oversee DAR implementation. Often, countries may not have dedicated digital agriculture departments or leadership, so this step establishes early structures and processes that can become long-term fixtures in the country. Create charters with clear roles and responsibilities for implementation and establish dedicated roles such as a Digital Agriculture Delivery Unit or Project Management Office. *See next page for further detail.*

5D. Design monitoring, evaluation, and learning (MEL) approach: Design a MEL approach to track progress and success, inform adjustments, optimize resource allocation, and demonstrate the value of investments. *See pages 40-41 for details.*

5E. Periodically review the DAR: Regularly review and update the DAR, in line with evolving priorities, lessons learned, and shifts in the digital and agricultural landscape.

Illustrative outputs / resources

Initiative charters for each prioritized use case

Governance structure for DAR implementation

Deep dive | 5. DAR implementation timeline

Objective

DAR implementation typically spans approximately five years, like many national strategies.

Implementation usually begins with the establishment of a management unit – such as a Project Management Unit (PMU) – to coordinate and oversee activities.

From there, countries typically adopt a phased approach. The first phase could focus on high-priority initiatives that can deliver transformational change, establish foundational enablers, and demonstrate early impact.

Subsequent phases can expand on this foundation with initiatives that enhance impact, generate complementary benefits, and scale early successes.

Illustrative DAR implementation timeline

Year 1	Year 2	Year 3	Year 4	Year 5

DAR **Development** (4 – 6 months)

DAR Implementation: Management stand-up & **Pilot** (1 – 2 years)

DAR Implementation: **Build** (1 – 2 years)

DAR Implementation: **Scale** (~2 years & beyond)

Timeline is illustrative and depends on the country context and priorities

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Deep dive | 5B. DAR implementation funding

Effective DAR implementation requires mobilizing funding from a diverse range of actors. While some agencies may be able to support a DAR in its entirety, in many cases, it is important to mobilize a consortia of funders around critical solution areas. Funders should be engaged early and consistently throughout the DAR process through mechanisms such as funder circles and engagement to co-design initiatives at the intersection of DAR and funders' priorities. Multiple complementary funding pathways can be pursued:

1. Private sector model
The DAR process will identify numerous initiatives with viable commercial returns, enabling funding from and partnership with the private sector. This includes leveraging private sector investment windows to drive capital toward agtech innovation, incubation, and scale-up. Key tactics include mobilizing patient capital, supporting entrepreneurship, and enabling market-aligned commercial solutions that deliver on DAR priorities.

2. Public private consortia model
Initiatives with partial commercial viability can tap into blended finance and public-private consortia models. These require more intensive orchestration but offer powerful platforms for alignment and resource pooling. Multi-stakeholder consortia – comprising government ministries, private sector actors (e.g., agribusinesses, telecoms), development partners, philanthropic foundations, and multilateral institutions – can provide both coordination and catalytic investment.

3. Donor or government model
For initiatives unlikely to generate commercial returns, funding may come from official developmental assistance (ODA) or other funding including from development partners or philanthropies. These sources can support targeted initiatives aligned with specific priorities of donors or partners. This model is especially relevant for funding system-wide enablers like DPI and AI and should promote cross-ministerial and cross-sectoral collaboration, including in adjacent areas such as digital identity and payments.

Digital Agriculture Roadmap (DAR) Playbook

Deep dive | 5C. DAR implementation governance

Objective and approach

For successful DAR implementation, it is important to establish strong governance, including a clear government owner, dedicated capacity with technical, program management, and stakeholder coordination capabilities, and sufficient resourcing.

In many countries, the absence of a dedicated Digital Agriculture department or leadership makes it necessary to establish interim governance structures that can evolve into permanent fixtures. At the outset, governance bodies should be established to oversee DAR implementation and coordination, including a DAR Steering Committee, Digital Agriculture Delivery Unit (DAU) for execution, and technical committees for expertise and advisory support. Development partners can initially provide transitional support.

Over time, these structures can transition into permanent institutional roles with a designated Head of Digital Agriculture within the Ministry of Agriculture to ensure long-term ownership and alignment with national priorities. This structure may vary based on the country's institutions and digital maturity.

Digital agriculture governance should also include other government agencies (e.g., ICT / digital, finance, education) and may include development partners. Furthermore, it should continue deep engagement with key ecosystem stakeholders including private sector representatives (e.g., investors, solution providers), and beneficiaries / end users to continuously source and prioritize solutions.

Illustrative governance structure and roles

Ensures coordination and alignment with MoA policies and government initiatives

DAR Steering Committee (SC)

Digital Agriculture Technical Committee

Digital Agriculture Delivery Unit (DAU)

Funding circle

Offers advisory support to the DAU as a working group and serves as subcommittees, formed as needed based on the use case or initiative in focus

Owns the DAR and oversees strategic planning and facilitation of interactions with other government agencies

Provides financial support for the implementation of DAR use cases and initiatives as needed

Note: Select members of the DAU serve in the SC to ensure alignment between governance decisions and implementation

——— Execution role   ---------- Advisory role   Project team   Supporting team

Digital Agriculture Roadmap (DAR) Playbook

Deep dive | 5D. MEL best practices (I / II)

A well-designed monitoring mechanism helps track implementation progress of the DAR, assess whether activities are advancing as planned, identify bottlenecks, and make course corrections. Monitoring also strengthens accountability, especially in complex, multi-stakeholder, and multi-year initiatives.
Best practices include:

1. Establishing a clear methodology that outlines:
- Techniques: Methods for gathering, interpreting, and reporting data (e.g., metrics tracking, interviews, proxy indicators)
- Tools: Systems or software for data entry, consolidation, and analysis (e.g., Excel, integrated applications)
- Processes and cadence: Engagement touchpoints between stakeholders involved in MEL (e.g., alignment meetings)

Recommendations:
- Track metrics at both the initiative and overall DAR level, based on DAR Theory of Change or Results Framework
- Define **indicators that reflect meaningful use**[1], going beyond basic uptake to reflect actual value such as improved farmer outcomes. For example, 60 Decibels uses farmer-reported outcomes to assess impact, leveraging indicators such as whether digital solutions resulted in better seasons after use.
- Adopt **evaluation methods that credibly assess impact**, such as randomized control trials (RCTs) that compare outcomes of digital solution users against a baseline or control group. For example, Ama Krushi, an advisory platform in Odisha, India, delivered messages via SMS, IVR, and call center to 6.5 million farmers at an average cost of $0.18 per farmer per year. The benefit-cost ratio is $9-15, with advisory messages during high rainfall increasing farmer incomes by $30–$48. Similarly, Digital Green used RCTs in India and Ethiopia to evaluate the impact of video-based extension services.
- Ensure **access to quality, granular, and disaggregated data** that allows analysis across key thematic areas such as gender and climate resilience. For example, Co-Amana, a cooperative platform in Nigeria, leverages gender disaggregated data to better engage and tailor solutions to women.
- Consider an **all-in-one platform for monitoring** to enable real-time data entry and automated reporting. For example, the Ethiopia DAR team plans to use ClickUp, an integrated monitoring platform, for end-to-end tracking of DAR implementation using pre-defined indicators at both the initiative and overall levels. Initiative owners can update their progress, which can then be reviewed by the DAU, ensuring centralized oversight and visibility.
- Align early on **processes and cadence with all MEL stakeholders**, including initial alignment meetings, periodic evaluations, and ad hoc reviews

1. Meaningful use focuses on value rather than just operational use, providing a more robust measure of adoption and predicting sustained use and impact.
Source: Ethiopia Digital Agriculture Roadmap; "Meaningful Use: An overview for innovators" by 60 Decibels

Deep dive | 5D. MEL best practices (II / II)

2. Assigning governance and responsibilities with clearly defined roles to ensure effective oversight and successful implementation. Responsibilities should include measurement, monitoring, evaluation, learning, and reporting. The structure and role assignments should be tailored to each country's context, including existing monitoring practices and institutional capacity.

Recommendations:
- Ideally, the project governance team within the Digital Agriculture Unit (DAU) should lead MEL activities with strategic oversight
- Initiative owners can monitor and report progress within their respective initiatives, feeding data back to the DAU

3. Determining baseline and monitoring frequency for measuring change over time.

Recommendations:
- Determine the baseline using a method appropriate to data availability – this could include secondary sources, expert interviews, or rapid on-the-ground assessments
- Define data collection frequency based on reporting needs – whether periodic, by tranches, or ad hoc – to ensure timely insights

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Illustrative outputs / resources

Sample MEL framework and key considerations

DFS insights dashboard for Kenya, illustrating a data gathering approach for MEL

Source: Ethiopia Digital Agriculture Roadmap; 60decibels

Alternative approaches depending on country context

Countries vary in the overall strength and maturity of their digital and agriculture ecosystems. Characteristics might include:
- **Relatively nascent ecosystems**: Low digital agriculture activity, limited government and private sector capacity (e.g., Sierra Leone, Burundi)
- **Emerging ecosystems**: Some government-led or donor-supported digital initiatives, limited but growing private sector activity (e.g., Ethiopia)
- **Relatively advanced ecosystems**: Strong digital ecosystem, active government, thriving private sector and foundational enablers in place (e.g., India, Kenya)

The overall goal and focus of DAR development and implementation may differ depending on country context. Regardless of context, rapid diagnostics can be performed as a first step to test feasibility of DAR development, and to shape the DAR approach accordingly.

	Relatively nascent context	Relatively advanced context
Overall goal	Helping the government drive critical use cases and enablers	Enabling the full breadth of public and private solutions
Approaches		
Use case focus	Basic solutions and enablers such as advisory & extension services and digital and physical infrastructure	Higher-value, more advanced solutions such as refining infrastructure and driving markets and trade
Entry Point	Requires a government sponsor, but DAR process may initially be more donor-led	Requires a government sponsor and DAR process can be country/region-, donor- and / or private sector-led
Government capacity	Need to build digital agriculture capacity and governance and install donor-funded transitional support units, given frequent lack of existing digital and digital ag units and leadership	Leverage existing digital and digital agriculture units (e.g., in ICT or Ag) and align with existing strategies
Government engagement model	Driven more by development partner	Process more fully owned and led by the government, closely teaming with development partner
Resourcing Implications	Higher need for grant-funded TA and capacity-building	Greater potential for country co-funding and to crowd-in capital

Stakeholder engagement

Project governance and stakeholder management

Objective and approach

It is important to engage key stakeholders during DAR development to ensure alignment with priorities, secure buy-in, and receive expert input.

Project governance

A project governance team should be established to oversee DAR development, make decisions, and ensure alignment with the vision and priorities. This team lays the early foundation for implementation and ultimately determines how digital agriculture is structured and operated in the country.

In addition, it is important to engage a broader set of stakeholders, including government agencies (e.g., Finance, ICT, Water), financiers, solution providers, implementing partners, and end-users critical across the agriculture value chain. These stakeholders should provide early input and validation based on their expertise and stay informed on its progress.

Engagement model

Stakeholders can be engaged through a range of modalities, including interviews and targeted workshops on topics such as use case prioritization. It is also beneficial to plan for at least two national convenings to gather input on use cases and align on a shared vision, and to ensure alignment around the roadmap, funding and stakeholder roles.

Key stakeholder groups and roles in DAR development

Project governance team

DAR Steering Committee	DAR Technical Committee	Funder Group

Role

Owns the DAR, makes key decisions and ensures alignment with the vision and priorities	Serves as an advisory providing expertise and input on the DAR	Contributes to discussions on prioritization and funding opportunities

Broader stakeholder groups

Additional government agencies (e.g., *Ministry of ICT*)	Financiers *(e.g., donors, private investors)*	Solution providers and implementing partners *(e.g., NGOs, agri-tech companies, telcos)*	Users *(e.g., farmers, agribusinesses)*

Role

Provides input and validation and expresses early buy-in and interest in supporting DAR financing and implementation

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Deep dive | Stakeholders to engage during DAR development

Stakeholder group	Potential stakeholders
Project governance team	
DAR Steering Committee	• Government/government agency that will "own" the DAR long-term (e.g., Ministry of Agriculture) • Key development partners supporting DAR development (e.g., donor organizations)
DAR Technical Committee	• Government/government agencies involved in delivery or impacted by the DAR (e.g., Ministries of ICT, Health, Trade, Education, Water, Environment / Natural Resources Management, Finance) • Development partners • Industry bodies • Farmer associations/co-operatives • Private sector organizations involved in digital agriculture at scale (e.g., telcos)
Funder Circles	• Development funders
Broader stakeholder groups	
Other government agencies	• Additional government agencies critical to the agriculture value chain
Funders and investors	• Funders with interest in supporting DAR initiatives/use cases • Private investors • Banks
Solution providers & implementing partners	• Solution providers of digital agriculture solutions and implementing partners mandated to support delivery of the DAR (e.g., NGOs, agri-tech companies, telcos)
End-users	• Farmers • Farmer co-operatives • Agriculture input providers

Note: Cross-sectoral cooperation is important and government agencies engaged in the DAR Technical Committee or more broadly depends on the country context and need

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Digital Agriculture Roadmap (DAR) Playbook

Deep dive | Example stakeholder engagement modalities during DAR development

Project governance
Ensure strategic oversight, coordination, and decision-making for DAR development with both Steering and Technical Committees

1:1 interviews
Engage high-priority stakeholders on target topics to gather expertise and deep insights

Funder circles
Test financial support, secure commitments, and align funding strategies for DAR implementation

Targeted workshops
Facilitate focused discussions on target topics of the DAR (e.g., use case prioritization, roadmap validation)

Large convenings
Broad socialization, validation, and buy-in on DAR strategies and recommendations

Deep dive | Example cadence of DAR engagements

The below chart illustrates how stakeholders can be engaged throughout DAR development

	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6			
Wk #	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

TC 1

TC 2

TC 3

TC 4

TC 5

SteerCo 1: Inception
Hold inception meeting to align on project scope, workplans & governance

SteerCo 2: Diagnostic report
Align on level of maturity across the digital ecosystem

SteerCo 3: Draft roadmap
Discuss business cases of priority use cases including costs estimates and potential impact

SteerCo 4: Final roadmap & implementation plan
Finalize roadmap with an implementation plan sequencing use cases and assigning owners

1st funders circle

2nd funders circle

1st convening – with public, development & private actors
Socialize DAR approach and test vision and priority use cases

2nd convening – with potential partners and implementors
Present business cases & mobilize support for implementation

▲ SteerCo – Senior leadership providing overall project guidance

▲ Convening – Broad stakeholders validating findings & providing inputs

▲ Funder circle – Potential partners & investors co-designing initiatives

TC: Technical Committee   Includes private sector actors providing technical expertise

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Tips for getting started

DAR development timeline and resources

How long does it take to develop a DAR?

Developing a DAR is a short but important first step in a multi-year journey to systematically scale digital agriculture across the country. The specific time required varies, influencing the resourcing required. For example:

- 4–8 weeks for a rapid diagnostic
- Up to 6 months for a comprehensive, multi-use case roadmap

What affects the timeline and resources required?

- **Scope of the DAR:** Scope can be modified depending on a country's or funder's needs such as completing a rapid diagnostic vs. a full roadmap, reducing the number and complexity of use cases, focusing on sub-national regions or specific crops or stages of the value chain
- **Stakeholder engagement intensity:** Time for consultations, workshops, and national convenings, need for alignment across ministries, funders, and ecosystem actors can be adapted
- **Starting point:** Existence of robust diagnostics, strategies, or data in country, which can enable focus on building a structured roadmap and designing the investment and implementation plan
- **Government capacity and support:** Existence of dedicated teams in Ministries that can actively support the process

DAR development funding

Costs and benefits

External funding for technical assistance is typically required to develop a DAR, as government ministries and development partners may have limited in-house technical capacity and resources. Dedicated funding is especially critical in LMICs, where the need is high but resources are constrained.

Key cost categories typically include:

- **Research and analysis:** Diagnostic assessments, use case prioritization, roadmap design and planning
- **Stakeholder engagement and coordination:** Interviews, convenings, and workshops, and establishing and managing multi-actor collaboration throughout the process
- **Government capacity strengthening:** Upskilling and facilitating institutional readiness of the lead ministry

Upfront investment in DAR development unlocks long-term value by:

- **Ensuring delivery of high ROI initiatives** aligned with national priorities
- **Crowding in investment** from a diverse set of funders through a structured investment plan
- **Strengthening institutional capacity** and laying the foundation for governments to lead and sustain digital agriculture transformation
- **Increasing productivity, farmer income**, inclusivity and economic growth, and strengthening food security and food systems resilience

Funding sources

DAR development can be financed by various actors based on strategic interests:

- **Development partner funded:** Bilateral and multilateral actors support DARs as a means to align funding with high-impact, national priorities. For example, the Gates Foundation supported DARs for Ethiopia and Odisha, India.
- **Government funded or co-funded:** Governments may allocate national, regional, or sectoral budgets to fund DAR development, increasing ownership and effectiveness of public investment.
- **Private sector funded:** Private sector entities, such as agribusinesses, technology firms, or private financial institutions may fund DAR development when aligned with their strategic interests – such as expanding into priority markets, influencing enabling conditions, and building government partnerships.

DARs can be timed with the planning of larger development investments, including sovereign loans or flagship programs. In such cases, DARs help define country-level priorities and guide the design of high-impact initiatives. For example, the World Bank intends to develop DARs for countries in its Food System Resilience Program (FSRP), then leverage the DARs to guide larger tranches of FSRP funds in the coming years. Other funders may find it helpful to take a similar approach.

DAR development may be supported by individual funders or multi-stakeholder consortia, such as pooled funding platforms or programmatic windows led by anchor funders, These models enhance impact and reduce fragmentation and duplication.

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Digital Agriculture Roadmap (DAR) Playbook

Chapter 3: Lessons learned

Lessons learned summary

Scope and prioritize appropriately

Given the breadth of digital agriculture, DAR should be scoped along key dimensions such as geographic or value chain coverage to ensure it is impactful and investable

Tailor to the country context

Understanding a country's starting point is important to ensure alignment with national priorities, adjust for the country's context, and build effectively from existing strategies

Adopt a use-case driven approach ("front to back")

"Front to back" approach starts with the problems that must be solved, to ensure prioritization of efforts that drive greatest impact and value

Engage stakeholders early and frequently

Stakeholder engagement is critical including using convenings to build momentum and alignment, and strongly engaging the private sector

Engage funders early

Funder engagement is crucial to secure early buy-in and commitments toward implementation

Ensure government ownership

Government will, technical capacity, and ownership are essential to anchor the DAR in national priorities, drive cross-sector coordination, and ensure sustainable implementation

Lessons learned in DAR development (I / VI)

Lesson 1: Scope and prioritize appropriately

Given the wide range of opportunities to use digital to transform the agriculture sector, it is important to define the DAR's scope to ensure it targets the country's most critical priorities. While DAR development typically begins with a comprehensive perspective to be inclusive of all potentially relevant areas, the scope is often narrowed over time to concentrate on specific dimensions, including:

- **Geographic focus**: National or sub-national (e.g., regional, state-level)
- **Agricultural sub-sector**: Crops (specific varieties), livestock, and / or value chain coverage
- **Thematic priorities**: Climate, gender, private sector, and more
- **Use case areas**: Extension and advisory services, financial services, supply chain management, and more
- **Strategic layers**: Digital stack, enabling environment

In Ethiopia, for example, the DAR initially explored digital opportunities across the entire agriculture sector. Over time, the focus was sharpened – guided by value chain coverage – toward specific use cases like fertilizer procurement and distribution, which aligned closely with government priorities. Throughout the DAR journey – from vision setting and prioritization of use cases and initiatives – it is essential to continuously assess where emphasis should be placed. Factors influencing scope can include the most pressing needs and opportunities, both immediate and long-term, as well as the priorities of key stakeholders such as government bodies and donors.

Lessons learned in DAR development (II / VI)

Lesson 2: Tailor to the country context

A one-size-fits-all approach does not work for DARs. DARs should be grounded in a solid understanding of the country's context and starting point, build from what the country needs, and should not duplicate or undo existing strategies. Countries can vary across factors such as the:

- Extent to which they have existing digital agriculture strategies and priorities that must be aligned to or that can be built upon
- Readiness and maturity of the ecosystem (e.g., vibrance of the private sector ecosystem, baseline digital capabilities and access)
- Local context, including regional disparities and agricultural practices, which influence the feasibility and design of digital solutions
- Capacity of the government to own and implement a DAR long-term and political priorities of key stakeholders

A thorough diagnostic assessment should be conducted at the outset. The DAR should then be tailored to align with national strengths, address critical gaps, and navigate key constraints. This ensures that the roadmap is not only strategic and high-impact but also realistic to implement given the country's resources and institutional landscape.

Digital Agriculture Roadmap (DAR) Playbook

Lessons learned in DAR development (III / VI)

Lesson 3: Adopt a use-case driven approach ("front to back")

DAR development should take a "front to back" approach, using a rigorous, stakeholder-driven process to identify and prioritize the most relevant and impactful use cases. The "front to back" process should start with the problems that must be solved – what users need and want and what is most appropriate given the country's context – then design and prioritize initiatives for each use case and across the digital stack and enabling environment that will allow the use cases to be executed. Without taking such an approach, strategies risk becoming collections of disconnected initiatives that lack traction, sustainability, and meaningful impact. In one country, for example, an initiative was undertaken to build and design integrated data platforms, but it had limited traction and success because it was not designed in a manner that would have the most impact for farmers. Starting with defining needs first then working backward to build relevant capabilities along the digital stack would likely have increased adoption and long-term success.

Digital Agriculture Roadmap (DAR) Playbook

Lessons learned in DAR development (IV / VI)

Lesson 4: Engage early and frequently with stakeholders including the private sector

DAR development requires early, strategic, and sustained engagement with a diverse set of stakeholders. For example, in developing the Ethiopia DAR, early stakeholder engagement was prioritized for input and buy-in on use case prioritization, vision setting, funding and implementation planning, as well as for targeted feedback by actors with knowledge on specific initiatives. This included the Ministry of Agriculture and its supporting institutions, relevant sector ministries such as Trade and Innovation, donors, politically influential stakeholders, and partner organizations with ongoing initiatives, such as IFAD and CGIAR. Key stakeholders to engage are outlined on pages 44-45, but there are a few important elements to consider:

- Beyond the Ministry of Agriculture, inter-ministerial engagement across the government helps ensure coordination, complementarity, and DAR alignment with national policies across relevant sectors, given the cross-cutting nature of digital agriculture. This should include the Ministry of Innovation/Technology who may own any existing national digital strategies, adjacent Ministries of Environment, Finance, Trade, Health and others, alongside key government bodies like the President's Office or institutes dedicated to Agriculture or Digital efforts.
- Regional representatives such as local NGOs should be involved, particularly in areas with regional disparities, to understand consensus perspectives on needs and opportunities
- Convenings can be powerful for building momentum and engaging with stakeholders crucial for DAR financing and implementation

The maturity of the private sector ecosystem varies between countries, with some having more developed start up and ag tech activities. Where possible, the **private sector should be engaged robustly and early**, as it serves multiple roles:

- Provides critical solutions that can be taken to scale (e.g., mobile payments, advisory, market solutions)
- Comprises key parts of the stakeholder base (e.g., farmers, input companies, processors)
- Provides private investment capital (e.g., for ag tech ventures)

Digital Agriculture Roadmap (DAR) Playbook

Lessons learned in DAR development (V / VI)

Lesson 5: Engage early with funders

DAR implementation relies on funding from donors, development partners, and the private sector. The DAR provides investible initiatives, but the ecosystem must be sufficiently vibrant, mature, and willing to engage. Therefore, engagement with funders – including multilateral and bilateral donors, development finance institutions, philanthropies, and private financiers – is critical. Engaging early helps identify what funders are likely to invest in and what initiatives they are already supporting. The DAR provides a powerful platform for future investments; includes important information on investment cases and potential financial ROI and impact. Bringing funders into the process early ensures that the use cases and initiatives prioritized are not only financially viable but built with their input. This helps secure early buy-in and commitment towards implementation. It also allows the government to shape its strategy in a way that attracts investment while maintaining national ownership and avoiding duplication of efforts already being funded.

Digital Agriculture Roadmap (DAR) Playbook

Lessons learned in DAR development (VI / VI)

Lesson 6: Ensure government ownership

Strong government ownership, leadership, and capacity are important for long-term success of the DAR. However, countries differ in their starting points—some points—some may face limitations in technical capacity, institutional readiness, and human or financial resources. In many contexts, formal governance structures governance structures for digital agriculture, such as a dedicated unit or leader, may not yet exist.

To ensure the DAR drives implementation and lasting transformation, it is essential to secure active government ownership from the outset. This includes includes designating a lead ministry and a senior-level "champion" to guide the process, ensuring alignment with national priorities, and embedding the DAR the DAR within official planning mechanisms. Ownership must go beyond formal endorsement; it requires ongoing accountability and active participation in DAR participation in DAR development and implementation. Over time, the DAR process can support governments in building more permanent institutional capacity. capacity. For instance, in Ethiopia, a transitional project management unit was initially supported by a development partner to oversee roadmap implementation. implementation. This structure is now evolving into a fully government-led digital agriculture unit, anchoring long-term leadership and sustainability.

Key considerations:
- **Identify and empower government "champions"**: Appoint champions at multiple levels: influential, senior-level champions (e.g., Lead within the Ministry of Ministry of Agriculture) to own DAR development and remove roadblocks; and additional champions across arms of the government to enable coordination. Champions should be empowered to mobilize resources and build momentum.
- **Establish permanent institutional capacity**: Develop or strengthen dedicated bodies such as Digital Agriculture Units within ministries to reduce reliance on external support and institutionalize implementation capacity.
- **Upskill the government workforce**: Embed digital skills development into training programs to ensure public sector staff can effectively support and implement digital agriculture initiatives.
- **Foster cross-ministerial collaboration**: Engage ministries beyond agriculture (e.g., ICT, education, finance) to ensure DAR priorities are mainstreamed into broader government strategies and budgets.

Digital Agriculture Roadmap (DAR) Playbook

Chapter 4: DAR case studies

Case studies | Digital Agriculture Roadmaps in India and Ethiopia

Two DARs were developed in Odisha State (India) and Ethiopia between 2023 and 2024

1 Ethiopia: 2024

Context

The Ethiopian Ministry of Agriculture and the Agricultural Transformation Institute in partnership with World Bank and the Gates Foundation developed a DAR

Approach

Developed an end-to-end DAR including situation analysis, use case prioritization in line with key stakeholder priorities, and a supporting strategic framework and roadmap to phase implementation of prioritized use cases

Projected impact

USD$90 M[1]+	~30 M[2]	~8%[2]
invested into digital agriculture	farmers reached of which 14m women	income increase for farmers (after 5 yrs)

2 Odisha State, India: 2023

Context

The Odisha State government in partnership with the Gates Foundation developed a DAR focused on high impact digital interventions to improve productivity, farmer income, and climate resilience

Approach

Developed a DAR that identified three big plays relevant to Odisha farmers and outlined a roadmap to implement initiatives that would enable said plays

Projected impact

USD$35-50 M	4-4.5 M	15-20%
invested into digital agriculture	farmers reached through initiatives	income increase for farmers (after 5 yrs)

1. Based on latest quantifications from certain projects that have kicked off; figure subject to increments as project/initiative-specific scoping is done; 2. Estimated impact from one representative use case | Source: Ethiopia Digital Agriculture Roadmap; Odisha Digital Agriculture Roadmap

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Digital Agriculture Roadmap (DAR) Playbook

Ethiopia's DAR

A diagnostic assessment of Ethiopia's digital agriculture landscape revealed significant gaps and opportunities

Use case area pillars

Advisory & Extension Services
- Status today: Low-tech delivery channels strong, but better integration with data needed e.g., weather
- Implications: Without real-time info integration, user won't pay (low sustainability)

Smart Farming
- Status today: Limited activity, emerging irrigation solutions e.g., Water Ways
- Implications: Smart farming not possible for farmers until other areas have matured (tech expensive)

Ag Intelligence
- Status today: Weather and soil (SSHI) decision-making functional, but these are the only use cases
- Implications: Decisions are woreda-level with little strategy; need national view

Financial Services
- Status today: Mobile money & banking better, but rural population underserved
- Implications: Will require mixture of solutions to serve the un-or underbanked e.g., cards, DA networks

Pricing & Market Services
- Status today: ECX[7] and NMIS[3] are generally good but limited in scope, and some data poor
- Implications: Though scope growing, data quality could hold back expansion

Supply Chain Management
- Status today: Private sector led by Lersha moving into aggregation, but no input tracing
- Implications: Inputs key pain point for years; will require investment to improve

Digital stack

User Facing Layer (Applications & Tools)
- Status today: Strong low-tech tools e.g., IVR 8028, improving market info & 30k tablets going to DAs, but high-tech tools e.g., Digital Green AI chatbot only pilots
- Low mobile banking usage (30%)[1] in financial services, but advanced from 2011 through Telebirr and m-Pesa
- Implications: Layer has improved, but more creative delivery channels required while smartphones and internet expensive

Integration Layer (Platforms & Pathways)
- Status today: Emerging solutions such as FarmStack provide strong middleware potential but need integration with further use cases; Limited presence of ag-specific mobile wallets solutions due to lack of mobile infrastructure and financial sector engagement
- Implications: All solutions must be built with private sector or telcos to ensure integration is possible and quick

Analytics Layer
- Status today: Some predictive weather and crop analytics at a national level through e.g. EDACAP[2]; and MINT launched the AI R&D Centre of Excellence; Lack of private sector activity presents challenges to ability to organically scale (e.g., Innovation Hub is an FAO initiative)
- Implications: Human capacity especially in the private sector is insufficient to scale analytics; will require training and investment

Data & Content (Agriculture & Adjacent)
- Status today: A lot of data is collected (522 data sets in the Agrihub), but it is either limited in scope (NMIS)[3], poor quality (livestock data), or not standardized or integrated (SSHI[4] trying to overcome this challenge); key focus for players e.g., CABI[5] & CoW[6] on governance; National/Farmer ID in pilot
- Implications: Big focus on data standardization pushing progress in this layer, but needs to be consolidated for targeted use cases to benefit farmers

Enablers

Digital Infrastructure
- Status today: Digital infrastructure available but cost is limiting accessibility; limited cloud and computing
- Implications: Competition needed to bring down price of data/phones to enable access

Innovation & Technology
- Status today: Limited innovation beyond government or NGOs, such as MINT[7] or DAIH
- Implications: Private sector needs to be more enabled and empowered, with less bureaucracy, to encourage innovation

Physical Infrastructure
- Status today: Existing physical infra semi-reliable, with satellites progressing towards more advanced physical infra
- Implications: New infra should closely target use cases to optimize spend

Governance & Policy
- Status today: Strong policies and frameworks, but limited governance or data standards
- Implications: Lack of interoperability & sharing; more data collected since 2019 but few end use cases

Agricultural Markets
- Status today: Inputs are limited, and currently hard to track, while value addition
- Implications: Even if linkages created, tools not relevant without improved procurement

Human Capital
- Status today: Low overall adult literacy is causing barriers to digital adoption, and digital skills ranked 119/134 countries[8]
- Implications: Incentives needed to overcome adoption barriers; dig ag training needed

1. GSMA 2023 2. Ethiopian Digital AgroClimate Advisory Platform 3. National Market Information Services 4. Supporting Soil Health Intervention 5. Centre for Agriculture and Bioscience International 6. Coalition of the Willing 7. Ministry of Innovation and Technology 8. Digital Skills Gap Index Wiley Report (2021)
Source: Ethiopia Digital Agriculture Roadmap

A maturity assessment revealed areas where the country had nascent versus strong capabilities across the digital stack

Digital Stack Component	Advisory & Extension Services	Smart Farming	Agricultural Intelligence	Financial Services	Pricing & Market	Supply Chain Management
User Facing Layer	**DAEAS programme expanding delivery channels** • 8028 hotline by ATI[1] with IVR[2]/SMS in 6 languages, 4M registered callers • Digital Green developing small pilot for AI chatbots • Digital kiosks piloted • 30k tablets going to DAs	**Limited activity, emerging solutions in irrigation** • Limited digital functionality even of 'precision' pilots • Some irrigation pilots such as Water Ways digitally enabled irrigators	**EDACaP[3] dashboard for climate and weather** • Robust national cross-cutting decision-making system EDACaP[3] primarily used by DAs • SSHI[4] datasets to be used for decisions	**Mobile money and banking cases increasing, led by national banks & EthioTel** • Mobile money platforms increasing users and distributing loans (1m by Telebirr) • National digital financing launches e.g., Michu	**Integrated commodity exchange market** • First SSA[5] electronic commodity exchange • NMIS[6] platform has 19 crops and 311 markets, with 1.2m callers for up-to-date pricing; limited reach	**Private sector led by Lersha moving into this space; some traceability** • Traceability solutions integrated with ECX[7] • Lersha has expanded with products in aggregation, delivery of mechanisation services
Integration Layer	**Limited integration features and little progress in FarmStack** • API[8] connectivity in Farmstack– will integrate data sources – but still limited interoperability	Limited information	**Well integrated national platform** • EDACaP[3] with fully API-enabled[8] web layer for use by DAs • Limited integration across private sector	**Interoperability between banks and in Telebirr** • Intra-bank and emerging payment gateways e.g., Chapa interoperable • Some mobile money integration in Telebirr	**Limited private sector connectivity; some ECX[7] integration** • ECX[7] data orchestration & secure payment system • NMIS[6] integration into advisory	**API-connectivity[8] of national ECX[7] platform** • IBM-enabled national traceability system fully integrated w/ ECX[7] • Limited integration for inputs
Analytics Layer	**Some national predictive weather and crop analytics** • Use of crop modelling and climate and weather forecasting (Clim-ARM) • Limited private sector activity, with no initiatives to produce analysed weather or predictive crop information for sale • Recent MINT launch of AI R&D Centre • CGIAR and CIAT using soil data for machine-learning site-specific fertilizer recommendations			**Banking analytics nascent** • Banks using some transaction data for credit, but limited	**Limited forecasting but some analytics on ECX[7]** • ML / predictive analytics for ECX[7] quality control • Limited price forecasting	Limited information
Content & Data Sets	**National focus on soil, agronomy and climate data; increasing usage by extension agencies for advisory or decision support** • Comprehensive national Soil Information System (EthioSIS), and Supporting Soil Health Intervention datasets coupled with agronomy research set up to inform decisions • Robust climate-focused national data set EDACaP • Livestock Information System roadmapped, but no implementation • Great deal of data collected, but no strategy and data is not integrated • Farmer profiling with National ID integration via MOSIP[8] being piloted to underpin use cases			**High level transaction data** • Transaction data collected nationally and by main banks but not at a more granular level • Limited credit or insurance data	**Daily up-to-date pricing data w/ accessible user channels; limited data beyond ECX[7] traded crops** • Mobile push service w/ daily market information via text message / IVR[2] by NMIS[6], but only for 19 crops and 311 markets • Quality, health and safety data via bar code for inputs but not regulated or enforced with consistency	

◖ *Nascent*   ◐ *Exists, Needs strengthening / Not at Scale*   ● *Relatively Strong / At Scale*   ⌃ *Improvements in maturity vs 2019*

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Digital Agriculture Roadmap (DAR) Playbook

A maturity assessment revealed areas where the country had nascent versus strong capabilities across the enabling environment

Enabling environment

🌓 Innovation and technologies

Limited innovation beyond government organisations, such as MINT[1] or the Digital Agriculture and Innovation Hubs
- MINT[1] launched an AI R&D Centre for analytics in 2021, which has produced a coffee leaf disease detection and severity estimation analytics tool
- Nascent use of new tech and innovations through the DAIH[2], such as exploring drone technologies for agriculture and water resource management
- Some private sector companies e.g., Lersha, Hello Tractor, but very few innovating in this space

🌓 Digital infrastructure

Digital infrastructure available but cost is limiting accessibility; limited cloud and computing
- ⌃ 85% of population covered by 3G network (SSA av. 84%)[3]
- Data however is 5% GNIpc vs 3% for LMICs[4] and smartphone 96% GNIpc vs 34% in Kenya[5]
- Moderate-weak levels of base digital use (only 59% mobile ownership vs. 93% in Kenya[6] and 17% internet penetration vs 43% in Sub-Saharan Africa)[7]
- Low private sector presence of strong advanced computing capabilities (2 small known cos – Sun Data World, HomeLink)
- Cloud infrastructure is present but server space is still highly cost-restrictive for small businesses (between $50-100 p.a.)

🌓 Physical infrastructure

Existing physical infrastructure average maturity, with satellites progressing towards more advanced physical infra
- ⌃ Recent launch of Chinese-backed satellite expected to provide remote sensing opportunities (owned by Ethiopia)
- There are a few central storage facilities that are largely concentrated in Addis Ababa, but more have been built in agricultural centres such as Bishoftu
- Road quality in Ethiopia is assessed as 3 out of 7 in the 2023 road quality index (below the global average of 4.05), with no overall changes since 2019[12]

🌓 Governance and policy

Strong policy frameworks but limited operationalizing at the regional level, including standards adherence
- Strong agricultural policy frameworks but limited or restrictive in digital agriculture, adjacent sectors
- Policy at a federal level is strong, but is misaligned between regions e.g., different enforcement for existing fertilizer and seed standards policies
- ⌃ New data policies e.g., personal data policy by MINT in endorsement stage, and e-transaction data endorsed, plus policies for rural connectivity & banking
- MoA Agrihub established to collate and consolidate data, and ECA[8] to regulate it, but 22 databases and systems in MoA alone with no integration
- Engagement of NGOs e.g., CABI[9], Coalition of the Willing to encourage data sharing and develop governance

🌓 Agricultural markets

Inputs are limited, and currently hard to track, while value addition and access to improved markets is nascent
- Access to inputs limited with major shortages
- Lack of a proper input tracking system
- Value addition capabilities low except for limited commodities e.g., some oilseeds
- Sales through physical market channels, with burgeoning roles for cooperatives and unions

🌓 Human capital and infrastructure

women Low overall adult literacy is causing barriers to digital adoption, while training on digital topics is not ag focused
- Adult literacy rates of ~52% with women 10-15% less literate than men (relatively low for SSA)[10]
- Digital skills in Ethiopia ranked 119/134 countries[11]
- Provides barriers to scaling of more robust digital technologies such as mobile apps
- No existing digital agriculture training or educational pathways – ATVETs do not deliver digital agriculture specific curricula according to MoA assessment

🌓 *Nascent*   🌓 *Exists, Needs strengthening / Not at Scale*   ● *Relatively Strong / At Scale*   ⌃ *Improvements in maturity vs 2019*

1. Ministry of Innovation and Technology 2. Digital Agriculture Innovation Hub (FAO initiative) 3. GSMA Mobile Connectivity Index 4. ITU price baskets data (2022) 5. Alliance for Affordable Internet, 2021 6. Usage and penetration Ecofin 2023 7. GSMA 2023 8. Ethiopian Communications Authority 9. Centre for Agriculture and Bioscience International 10. World Bank Development Indicators 2020 11. Digital Skills Gap Index Wiley Report (2021) 12. World Population Review 2023 Road Quality Index

Three inputs were used to determine priority use cases

1

National convening

Stakeholders ranked use cases 1-5 on both impact & feasibility, then calibrated across solution areas

+

2

Stakeholder interview

>30 stakeholders from government, donors, NGOs and private sector identified their top 3-5 use cases

+

3

International & local metrics

Metrics were used from international and local cases and studies to produce impact & feasibility scores

>

Five priority use cases

1. Access credit & insurance[1]
2. Procure & distribute inputs
3. Track and trace inputs
4. Deliver timely interventions to protect crops and livestock
5. Access better markets

Source: Ethiopia Digital Agriculture Roadmap; Note: 1. Credit and insurance use cases bundled as Phase 1 priority, will likely require different implementation approaches

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Digital Agriculture Roadmap (DAR) Playbook

National convening | Credit, procuring and tracking inputs, and timely interventions were highest priority use cases from the national convening

High priority, longer-term implementation

Highest priority

Medium priority

High priority

Impact — High, 5, 4, 3, Low

Feasibility — Low, 3, 4, 5, High

Legend:
- **SF** Smart Farming
- **FS** Financial Services
- **PM** Pricing & Market Services
- **SC** Supply Chain Management
- **AI** Agricultural Intelligence

SF1. Improve crop varieties
SF2. Use & maintain farm machinery
SF3. Irrigate crops
SF4. Dispose of & manage farm waste
FS5. Access credit
FS6. Lease or purchase machinery
FS7. Access to insurance
FS8. Access investment
FS9. Access to mobile banking & money
PM10. Manage business activities
PM11. Access better markets & buyers
PM12. Understand up-to-date transparent pricing for products
PM13. Assure quality of outputs
PM14. Sort and grade output
SC15. Track and trace inputs
SC16. Transport & store outputs safely
SC17. Track and trace output inventory
AI18. Deliver timely interventions to protect crops or livestock
AI19. Develop carbon and climate credentials for markets
AI20. Improve livestock management
AI21. Procure and distribute inputs

Highest priority

Source: Ethiopia Digital Agriculture Roadmap; Note: Used consolidated table prioritization (e.g., scores agreed by the whole table) except for use cases which were not in any tables 5 highest priority use cases: Dispose of and manage farm waste, Access investment, Sort and grade output, Track output inventory, and Develop carbon and climate credentials for markets

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Digital Agriculture Roadmap (DAR) Playbook

Stakeholder interviews | Government, NGOs, donors, and the private sector prioritized financial, supply chain and ag intelligence use cases

Smart farming		Financial Services		Pricing and market services		Supply chain management		Ag Intelligence	
Use and maintain farm machinery	4	**Access credit**	9	Access better markets and buyers	4	**Track and trace inputs**	15	**Deliver timely interventions to protect crops or livestock**	6
Improve crop varieties	3	Access to insurance	4	Manage farm business activities	2	Track and trace output inventory	3	**Procure and distribute inputs**	6
Irrigate crops	2	Lease or purchase machinery	2	Understand up-to-date transparent pricing for products	2	Transport and store outputs safely	0	Develop carbon and climate credentials	0
Dispose of and manage farm waste	0	Access investment	1	Assure quality of outputs	1			Improve livestock management	0
		Access to mobile banking and mobile money	1	Sort and grade output	0				

Number of stakeholders prioritising use case   ☐ 0-3 times prioritized   ☐ 4-5 times prioritized   ☐ 6+ times prioritized

Source: Ethiopia Digital Agriculture Roadmap; Note: 30 stakeholders interviewed, with 20 stakeholders completing the use case prioritization

Digital Agriculture Roadmap (DAR) Playbook

International and local metrics | Four use cases were the highest priority based on metrics

Impact (y-axis): High, 5, 4, 3, 2, 1, Low

Feasibility (x-axis): 1 (Low), 2, 3, 4, 5 (High)

Plot zones: High priority, longer-term implementation; Highest priority; Medium priority; High priority

Plotted items:
- SC 15
- AI 18, SF 1, FS 5, AI 21
- AI 20, FS 6, SF 2
- PM 14, PM 11, FS 7, PM 12
- SF 4, SC 16, SF 3, FS 9
- FS 8, PM 13, SC 17
- AI 19, PM 10

Legend:
- SF — Smart Farming
- FS — Financial Services
- PM — Pricing & Market Services
- SC — Supply Chain Management
- AI — Agricultural Intelligence

Source: Ethiopia Digital Agriculture Roadmap

SF1. Improve crop varieties
SF2. Use & maintain farm machinery
SF3. Irrigate crops
SF4.Dispose of & manage farm waste
FS5. Access credit
FS6. Lease or purchase machinery
FS7. Access to insurance
FS8. Access investment
FS9. Access to mobile banking & money
PM10. Manage business activities
PM11. Access better markets and buyers
PM12. Understand up-to-date transparent pricing for products
PM13. Assure quality of outputs
PM14. Sort and grade output
SC15. Track and trace inputs
SC16. Transport & store outputs safely
SC17. Track and trace output inventory
AI18. Deliver timely interventions to protect crops or livestock
AI19. Develop carbon and climate credentials for markets
AI20. Improve livestock management
AI21. Procure and distribute inputs

Highest priority

Digital Agriculture Roadmap (DAR) Playbook

International and local metrics | Metrics were used where available and either assessed qualitatively or quantitatively, and an average was taken

Scoring principles

Metrics from international or domestic case studies or research used where available

If unavailable, either a qualitative assessment made, or the criteria skipped

Qualitative assessment cross-referenced and sense-checked with information from interviews and with local team

Average taken for each impact and feasibility across number of assessments or metrics available

	Criteria	Metric	Available data (# of use cases we were able to assess per criterion & how)	Scoring ranges
Impact	Income	Estimated % increase income	15 assessed via quantitative metrics 6 assessed qualitatively	5 = >50%, 4 = 40-50%, 3 = 30-40%, 2 = 10-30%, 1 = <10%
	Production	Estimated % increase output	6 quantitative metrics 6 assessed qualitatively 9 use cases with insufficient data to assess	5 = >50%, 4 = 40-50%, 3 = 20-40%, 2 = 10-20%, 1 = <10%
	Number of impacted farmers	Estimated % total farmers	7 assessed via quantitative metrics 14 assessed qualitatively	5 = >50%, 4 = 40-50%, 3 = 30-40%, 2 = 10-30%, 1 = <10%
	Climate resilience and impact	Resilience improvement or sequestration	4 assessed via quantitative metrics 1 assessed qualitatively 16 use cases with insufficient data to assess	Different metrics across each (e.g., farmer surveys on resilience, tonnes of CO_2 sequestered)
Feasibility	Implementation time	Farmers onboarded per year	15 assessed via quantitative metrics 6 assessed qualitatively	5 = >400k p.a., 4 = 100-400k p.a., 3 = 50-100k p.a., 2 = <50k p.a., 1 = limited to no scaling
	Existing initiatives	# and scale of initiatives	21 assessed via quantitative metrics	Different metrics (e.g., scale vs. number of initiatives)

Source: Ethiopia Digital Agriculture Roadmap

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Through a combination of stakeholder input and analysis of metrics, 5 use cases were prioritized

No.	Use case	Convening priority	Stakeholder priority	Metric priority	Overall priority
SF1	Improve crop varieties			✓	
SF2	Use and maintain farm machinery		✓	✓	
SF3	Irrigate crops				
SF4	Dispose of and manage farm waste				
FS5	Access credit	✓	✓	✓	✓
FS6	Lease or purchase machinery	✓			
FS7	Access to insurance		✓	*Note: Bundled with credit*	
FS8	Access investment				
FS9	Access to mobile banking and mobile money				
PM10	Manage farm business activities				
PM11	Access better markets and buyers	✓	✓		✓
PM12	Understand up-to-date transparent pricing for products	✓		✓	
PM13	Assure quality of outputs				
PM14	Sort and grade output				
SC15	Track and trace inputs	✓	✓	✓	✓
SC16	Transport and store outputs safely				
SC17	Track output inventory				
AI18	Deliver timely interventions to protect crops or livestock	✓	✓	✓	✓
AI19	Develop carbon and climate credentials for markets				
AI20	Improve livestock management				
AI21	Procure and distribute inputs		✓	✓	✓

✓ High priority   ✓ Medium priority   ✓ Overall highest priority

Source: Ethiopia Digital Agriculture Roadmap

Digital Agriculture Roadmap (DAR) Playbook

A two-step process was used to prioritize digital stack and enabling environment initiatives

Referencing: List of initiatives gathered from various sources

National convening
- Participants identified pre-requisites for the digital stack and enablers for each use case

Stakeholder interviews
- Funder, gov. & private sector interviews
- Digital expert interviews

DAEAS roadmap
- Initiatives identified in the digital stack & enabling environment by DAEAS

Output: Longlist of initiatives

Prioritization: Initiatives then prioritized based on…

MoA implementation feasibility
- Initiatives that can be owned by MoA
- Initiatives that have existing momentum

Alignment with Ethiopian strategies
- Initiatives aligned with Digital Ethiopia
- Initiatives aligned with MoA strategies

Stakeholder and expert priorities
- Initiatives identified in the convening and stakeholder or expert interviews

Output: Shortlist of prioritized initiatives

Source: Ethiopia Digital Agriculture Roadmap

Digital Agriculture Roadmap (DAR) Playbook

Convening inputs, stakeholder interview, and the DAEAS roadmap initiatives were combined to form a longlist of initiatives

Digital stack

User Facing Layer (Applications & Tools)
1 Software development curriculum to build capability for user-facing layer
2 Digitized payments through rural service points and other channels
3 Decision-making dashboard for MoA

4 Integration Layer (Platforms & Pathways)
4 Digital Agriculture Forum to promote interoperability
5 Data stack with APIs

Analytics Layer
6 Input demand and supply analytics
7 Dedicated analytics unit within MoA

5 Data & Content (Agriculture & Adjacent)
8 Farmer profiles and unique ID
9 Land & farmer-linked production data
10 Soil data
11 Transaction and warehousing data
12 Weather data
13 Price data

Enabling Environment

6 Government and Policy
14 Data governance and sharing policy, standards, assurances and incentives
15 Support market entry of international products to Ethiopia (with local partner)
16 Streamline extension content approval process

7 Digital Infrastructure
19 Device access for extension workers
20 Free access for DAs and farmers to key apps
21 Phone payment plan for farmers
22 Telco service targets and incentives for rural areas
23 Digital kiosks for farmers and DAs

8 Human Capital & Infrastructure
25 Digital agriculture department in MoA
26 Digital training platform for MoA/RBoA
27 Digital program in ATVETS
28 Digital literacy for farmers and DAs
29 Improve DA management

9 Innovation & Technologies
30 Competitive incubation / product dev. environment with forum
31 Working space & training for ag techs
32 Digital agriculture curriculum

Physical Infrastructure
17 Input warehouses and distribution hubs
18 Solar panels for FTCs or OSSs

Agricultural markets
24 Incentivized cooperative and union aggregation and value addition

Key: 16 New initiatives   16 DAEAS initiatives

Source: Ethiopia Digital Agriculture Roadmap

Digital Agriculture Roadmap (DAR) Playbook

Six initiatives were highlighted as nearest-term priorities

Area		Initiative	MoA implementation	Strategic alignment	Stakeholder priority	**Near-term priority**
Digital stack	User facing	Software dev curriculum to build capability		High		
		Digitized payments		High		
	Integration	Decision-making dashboard for MoA	High			
		Digital Agriculture Forum for interoperability	High			
		Data stack with APIs	High	High	Medium	Overall highest
	Analytics	Input demand and supply analytics	High			
		Dedicated analytics unit within MoA	High			
	Data & content	Farmer profiles and unique ID	High	High	High	Overall highest
		Land and farmer-linked production data	High		Medium	
		Transaction and warehousing data	Medium			
		Weather data	Medium			
		Price data	High			
		Soil data	High			
Enabling environment	Innov. & tech	Competitive incubation / product dev. environment	Medium			
		Working space & training for ag techs	Medium			
		Digital agriculture curriculum		High		
	Digital infra	Device access for extension workers	High		High	
		Free access for DAs and farmers to key apps			High	
		Telco service targets and incentives for rural areas			Medium	
		Phone payment plan for farmers			High	
		Digital kiosks for farmers and DAs	High		High	Overall highest
	Ag markets	Incentivized aggregation & value addition	High			
	Physical infra	Input warehouses and distribution hubs	High	High		
		Solar panels for FTCs or OSSs	High	High		
	Human capital and infra	Digital agriculture department in MoA	High	High		Overall highest *(Dept. prioritized due to dependencies)*
		Digital program in ATVETS		High		
		Digital training platform for MoA and RBoA	High	High		
		Farmer digital & financial literacy campaign	Medium	High	Medium	Overall highest
		Improved DA management	High			
	Gov & policy	Data governance & sharing policy, standards, assurances	High	High	High	Overall highest
		Support market entry of international products				
		Streamline content approval process	High			

Legend: 🟢 High priority   🟡 Medium priority   ⬤ Overall highest priority

Source: Ethiopia Digital Agriculture Roadmap

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Digital Agriculture Roadmap (DAR) Playbook

Prioritized use cases informed development of Ethiopia's DAR vision and target state, where farmers are digitally enabled across the value chain

Solutions

Financing
Improved farmer income and resilience through access to affordable credit and long-term financing at favorable terms

Supply chain
Supply chain services that guarantee quality products on time by tracking and certifying inputs, and analysing demand

Extension
Timely, demand-base and accurate, customized crop or livestock -specific advisory & extension services to farmers

Price and market
Access to real-time market and price Information across all commodities at little to no cost

Farmer profile
Extensively accessible and reliable farmer data to support use cases and decision making
- Landholding, production, livestock data etc.
- Integrated with National ID program

Data
Interoperable and real-time obtainable data sets to increase insight extraction
- Interoperable ag data, data standards for collection, and robust data policy
- Data to inform content for advisory platforms

Digital Farmer

Satellite and sensor data on current production and yield

Enablers

Digital infrastructure
Enhanced & scaled digital infrastructure that increases rural connectivity and makes it more affordable for farmers

Funding and capacity
Sufficient project funding, implementation assistance and capacity development to enable a self-sustaining ecosystem

Private sector
Empowered private sector that allows for development of innovative tools, inc. targeted smart farming tools, at fair prices

Governance and Policy
Robust policy to develop a thriving business environment, drive coordination and make data-driven decisions (e.g., fertilizer distribution)

Source: Ethiopia Digital Agriculture Roadmap
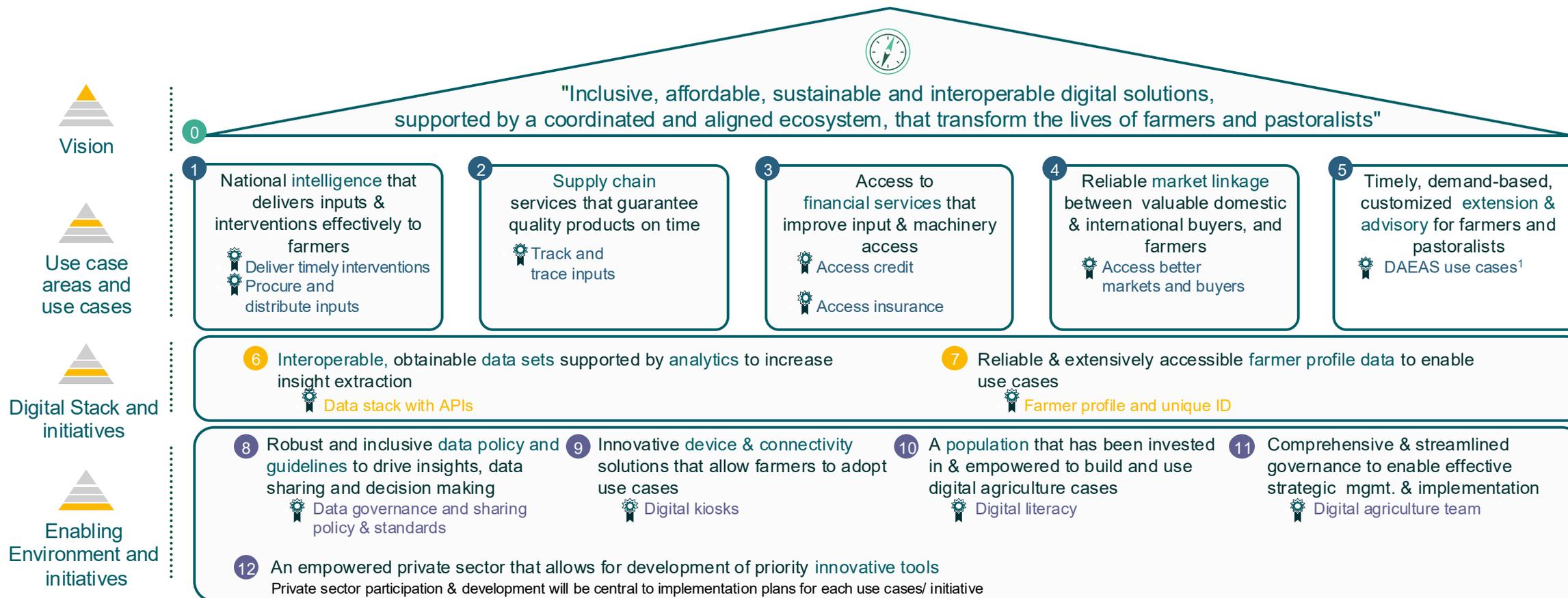
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Digital Agriculture Roadmap (DAR) Playbook

Ethiopia's DAR leveraged national convenings to co-create a shared vision over an eight-year time frame

"**Inclusive, affordable, sustainable and interoperable** digital solutions, supported by a **coordinated and aligned** ecosystem, **that transform** the lives of farmers and pastoralists"

Digital Agriculture Roadmap (DAR) Playbook

A strategic framework was developed that highlighted the vision, prioritized used cases, and initiatives

Vision

0   "Inclusive, affordable, sustainable and interoperable digital solutions, supported by a coordinated and aligned ecosystem, that transform the lives of farmers and pastoralists"

Use case areas and use cases

1   National intelligence that delivers inputs & interventions effectively to farmers
- Deliver timely interventions
- Procure and distribute inputs

2   Supply chain services that guarantee quality products on time
- Track and trace inputs

3   Access to financial services that improve input & machinery access
- Access credit
- Access insurance

4   Reliable market linkage between valuable domestic & international buyers, and farmers
- Access better markets and buyers

5   Timely, demand-based, customized extension & advisory for farmers and pastoralists
- DAEAS use cases[1]

Digital Stack and initiatives

6   Interoperable, obtainable data sets supported by analytics to increase insight extraction
- Data stack with APIs

7   Reliable & extensively accessible farmer profile data to enable use cases
- Farmer profile and unique ID

Enabling Environment and initiatives

8   Robust and inclusive data policy and guidelines to drive insights, data sharing and decision making
- Data governance and sharing policy & standards

9   Innovative device & connectivity solutions that allow farmers to adopt use cases
- Digital kiosks

10   A population that has been invested in & empowered to build and use digital agriculture cases
- Digital literacy

11   Comprehensive & streamlined governance to enable effective strategic mgmt. & implementation
- Digital agriculture team

12   An empowered private sector that allows for development of priority innovative tools
Private sector participation & development will be central to implementation plans for each use cases/ initiative

Source: Ethiopia Digital Agriculture Roadmap; 1. Based on use cases identified in prior DAEAS effort

As part of DAR development, high-level sequencing, timeline for implementation of the use cases and initiatives were planned

Phase 1 – 2025-2029
Build the digital foundation

Lay the groundwork for a digitalized agricultural ecosystem through key initiatives while developing the highest impact use cases to empower farmers

Phase 2 – 2030-2032
Diversify and scale the ecosystem

Continue to build use cases into the ecosystem using foundational initiatives, and strengthen pre-requisites, especially by improving and collecting data

Use case areas and use cases

Priority Use Cases (Phase 1)

- Deliver timely interventions
- Procure and distribute inputs
- Track and trace inputs
- Access credit and insurance
- Access better markets and buyers

Priority Use Cases (Phase 2)

- Improve crop varieties
- Access, use and maintain machinery
- Understand pricing
- Improve livestock management
- Irrigate crops
- Track output inventory
- Transport and store outputs
- Access mobile money
- Develop climate credentials
- Dispose of and manage farm waste
- Manage business activities
- Assure output quality
- Sort and grade output
- Access investment

Digital stack and enabling environment

Priority Initiatives (Phase 1)

- Farmer profile and ID
- Land and production data
- Digital stack and APIs
- Digital kiosks
- Data policy and standards
- Digital agriculture department
- Digital and financial literacy for farmers

Priority Initiatives (Phase 2)

- Land and production data
- Weather data
- DA device access
- Phone payment plan
- Decision-making dashboard for MoA
- Distribution hubs
- Soil data
- Price data
- Incubation and forum
- Streamline content approval process
- Digital ag training (for MoA and DAs)
- Digital ag curriculum
- Solar panels in FTCs or hubs
- Working space for ag techs
- Improved DA management
- Transaction data
- Incentivized value addition
- International market entry support

Source: Ethiopia Digital Agriculture Roadmap

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Digital Agriculture Roadmap (DAR) Playbook

To support implementation, three sets of documents were developed

DAR Strategy Document
Written report outlining DAR strategic initiatives

- Context of digital agriculture in Ethiopia (e.g., situational analysis)
- Key recommendations from DAR – prioritization and phasing of initiatives
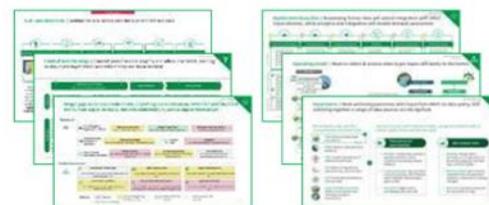- Roadmap's overall impact and total cost

Detailed business case
For select priority initiatives –incl. use cases, digital stack and enablers

- Outline of proposed solution and operating model
- Costing and implementation plan
- Recommended governance set up
- Outline of required enablers (e.g., data sets) and interdependencies
- In-depth impact assessment

Initiative charters
For all other initiatives – incl. use cases, digital stack and enablers

- Proposed solution and summary of related ongoing initiatives to leverage
- High-level cost and implementation plan/timeline
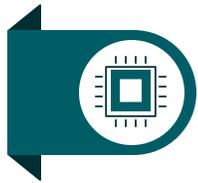- Related international benchmark deep dive

Note: Ethiopia's DAR is now in the implementation stage as of May 2025

Source: Ethiopia Digital Agriculture Roadmap

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Digital Agriculture Roadmap (DAR) Playbook

Odisha State, India's DAR

Odisha state had a strong starting point in digital interventions and infrastructure for farming

Non-exhaustive

Key digital assets and interventions in the state currently

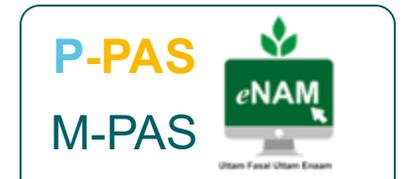|				
Digital database for ~ 7 Mn farmers; Land data digitized *Agri Data Exchange* for consent-based farmer info transfer	Modular *Konnect Agri Stack* platform available to plug and play next set of digital interventions	*Ama Krushi* advisory for 5.5+ million farmers through IVRs AI based AmaKrushAI in pilot stage	E2E digitization of subsidies application and DBT through *Go-Sugam* Digitized credit portal-*Safal*	Scaled digital procurement systems for paddy (*>5 Mn MT procured in 2021-22*) and millets (*>6L qt. of ragi procured* in 2022)

Source: On-ground conversations, GoO agri department website, GO-Sugam portal, press search

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Digital Agriculture Roadmap (DAR) Playbook

They conducted discussions and workshops with 70+ farmers, 20+ private players and GoO officials to create an action plan

Non-exhaustive

Group discussion with 70+ farmers and farmer groups	Conversations with private and development players	Workshop and one-on-one discussions with GoO officials
	Digital Green, SatSure, Jai Kisan, PxD Precision Development, Omidyar Network, EM3, ninjacart, SOCIAL alpha, Palladium Make It Possible, Pradan, varaha, Samagra Transforming Governance, TATA TRUSTS, DeHaat Seeds To Market	Consultative Workshop 1 Consultative Workshop 2 Discussions with officials from Agri, fisheries and animal husbandry departments

Source: Odisha State Digital Agriculture Roadmap

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Digital Agriculture Roadmap (DAR) Playbook

22 areas for intervention relevant to Odisha farmers were identified through conversations with stakeholders

Theme	Areas for interventions			
A Advisory and extension services	1. Real time customized advisory for farmers	🌾	🐄	🦐
	2. Farmer information services-Connecting farmers to general information and good agricultural practices	🌾	🐄	🦐
	3. Scaled formal training for farmers	🌾	🐄	🦐
	4. Precision Agri practices for crops, livestock, and fisheries based on farm specific dynamic data	🌾	🐄	🦐
B Farm Inputs & Production	1. Mechanization access services	🌾	🐄	🦐
	2. Predictive maintenance and governance of farm equipment	🌾	🐄	🦐
	3. Increasing efficiency of output processing for crops, livestock, and fisheries products	🌾	🐄	🦐
	4. Farm waste management systems - Upcycle farm waste for additional revenue	🌾	🐄	🦐
	5. Greenhouse gases monitoring and reduction		🐄	
C Financial services	1. Farmers' credit solutions platforms	🌾	🐄	🦐
	2. Digital delivery of e-vouchers and subsidies	🌾	🐄	🦐
	3. Delivery of farmers' insurance products	🌾	🐄	
	4. Payment systems for farmers	🌾	🐄	🦐
	5. Financial management/advisory for farmers	🌾	🐄	🦐
D Pricing and market services	1. E-Marketplaces (for inputs)	🌾	🐄	🦐
	2. E-Marketplaces (for outputs)	🌾	🐄	🦐
	3. E-Commerce services	🌾	🐄	🦐
	4. Price information: Helping farmers understand prices across buyer markets	🌾	🐄	🦐
E Supply chain management	1. Warehouse and outputs storage management	🌾	🐄	🦐
	2. Traceability and certification	🌾	🐄	🦐
	3. Quality management and quality control for outputs	🌾	🐄	🦐
	4. Logistics/Transport facilitation for outputs (incl. aggregation)	🌾	🐄	🦐

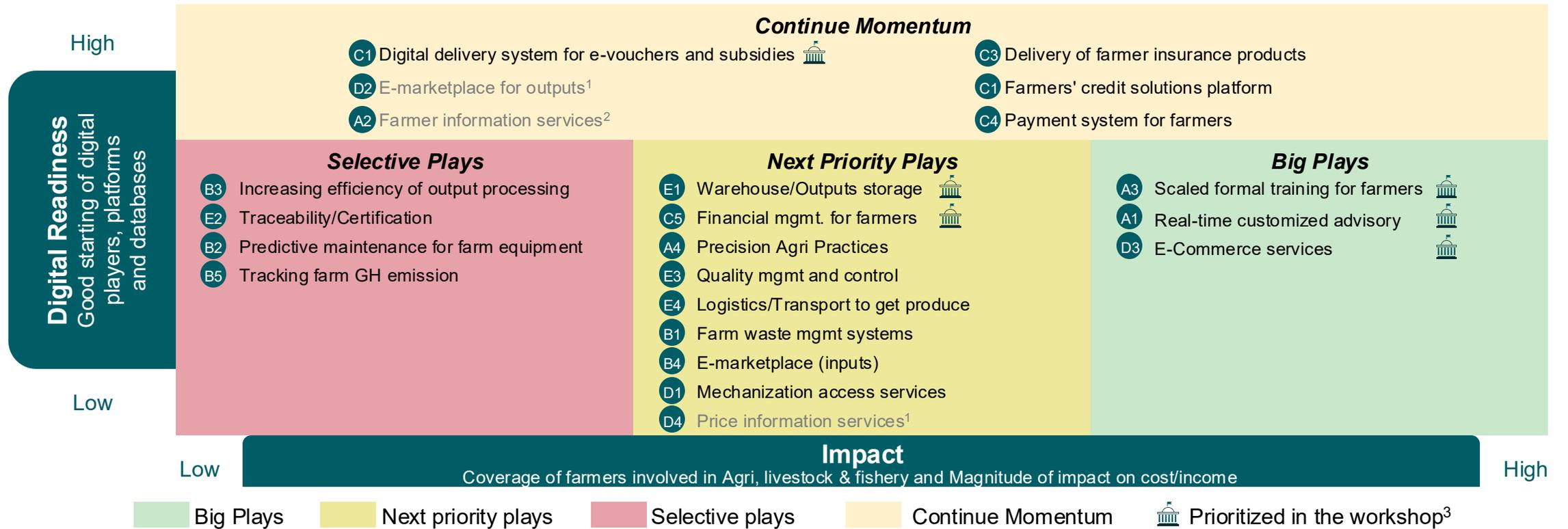Source: Odisha State Digital Agriculture Roadmap

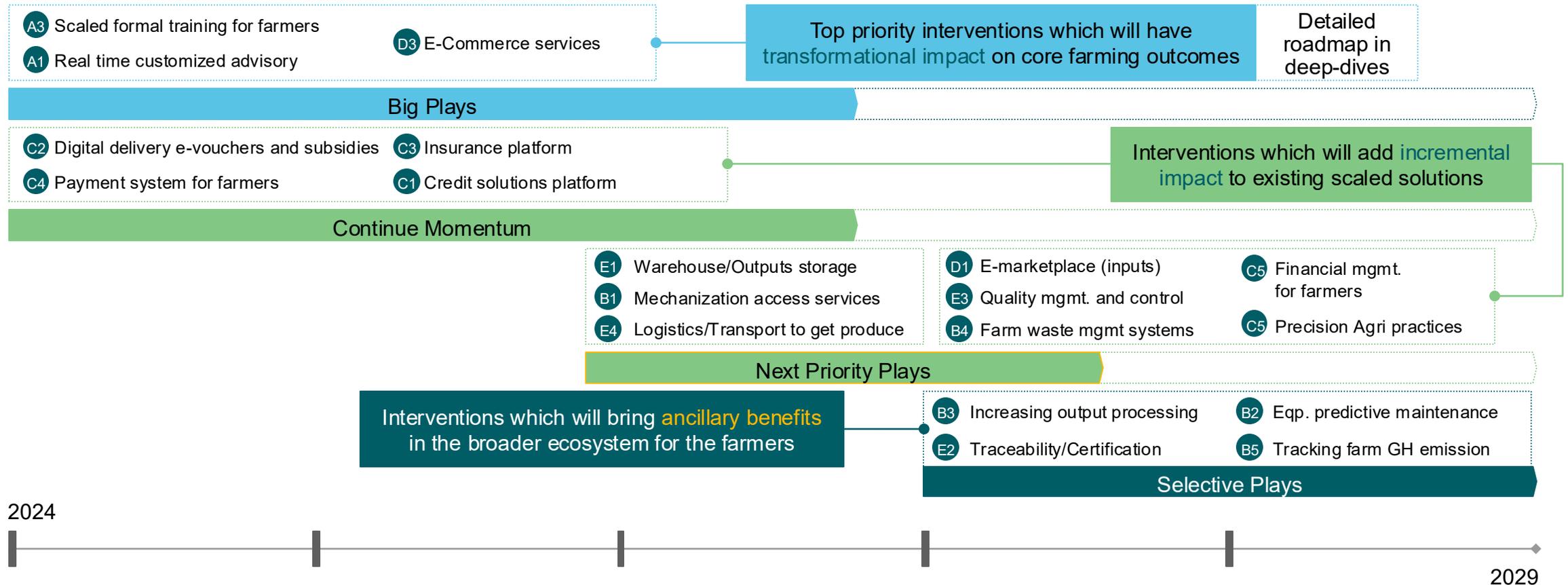🌾 Applicable to crops   🐄 Applicable to Livestock   🦐 Applicable to aquaculture

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Digital Agriculture Roadmap (DAR) Playbook

Impact and Digital Readiness scale was used to identify 3 Big Plays and 9 Next Priority Plays

Continue Momentum

High

C1 Digital delivery system for e-vouchers and subsidies 🏛

D2 E-marketplace for outputs[1]

A2 Farmer information services[2]

C3 Delivery of farmer insurance products

C1 Farmers' credit solutions platform

C4 Payment system for farmers

Digital Readiness
Good starting of digital players, platforms and databases

Selective Plays

B3 Increasing efficiency of output processing

E2 Traceability/Certification

B2 Predictive maintenance for farm equipment

B5 Tracking farm GH emission

Next Priority Plays

E1 Warehouse/Outputs storage 🏛

C5 Financial mgmt. for farmers 🏛

A4 Precision Agri Practices

E3 Quality mgmt and control

E4 Logistics/Transport to get produce

B1 Farm waste mgmt systems

B4 E-marketplace (inputs)

D1 Mechanization access services

D4 Price information services[1]

Big Plays

A3 Scaled formal training for farmers 🏛

A1 Real-time customized advisory 🏛

D3 E-Commerce services 🏛

Low

Impact
Coverage of farmers involved in Agri, livestock & fishery and Magnitude of impact on cost/income

Low   High

Big Plays   Next priority plays   Selective plays   Continue Momentum   🏛 Prioritized in the workshop[3]

1. To be phased as part of build-out of intervention D3, 2. To be phased as part of build-out of A1
3. Workshop conducted in July 2023 to identify priority digital use cases-attended by 40+ officials from Agri, Horticulture and Fisheries department of GoO

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Digital Agriculture Roadmap (DAR) Playbook

A plan was developed to implement interventions over 5 years

A3 Scaled formal training for farmers
A1 Real time customized advisory
D3 E-Commerce services

Top priority interventions which will have **transformational impact** on core farming outcomes

Detailed roadmap in deep-dives

Big Plays

C2 Digital delivery e-vouchers and subsidies
C4 Payment system for farmers
C3 Insurance platform
C1 Credit solutions platform

Interventions which will add **incremental impact** to existing scaled solutions

Continue Momentum

E1 Warehouse/Outputs storage
B1 Mechanization access services
E4 Logistics/Transport to get produce
D1 E-marketplace (inputs)
E3 Quality mgmt. and control
B4 Farm waste mgmt systems
C5 Financial mgmt. for farmers
C5 Precision Agri practices

Next Priority Plays

Interventions which will bring **ancillary benefits** in the broader ecosystem for the farmers

B3 Increasing output processing
E2 Traceability/Certification
B2 Eqp. predictive maintenance
B5 Tracking farm GH emission

Selective Plays

2024

2029

Chapter 5: Resource toolkit

Resource toolkit | Table of Contents

Resource Item	Resource type		Page Number
1. Summary of key resources for each step of DAR development	📄		87-89
2. SAID framework for digital agriculture ecosystem mapping	⬟		90
3. SAID digital agriculture ecosystem maturity model	⬟		91
4. Use case prioritization matrix and example	⬟	✎	92
5. Governance structure for DAR implementation example	✎		93
6. Use case initiative charter example and template	✎		94–95
7. Example work plan for DAR implementation	✎		96
8. Example interview guides for key stakeholder groups (donors, private sector, farmer groups)	✎		97–99
9. Example agenda for national convenings during DAR development	✎		100–101
10. MEL sample framework	⬟	✎	102
11. Use case examples and use case and solution library	📄	✎	103–107
12. Emerging insights on Digital Public Infrastructure for Agriculture	⬟	✎	108–110
13. Emerging insights on AI for Agriculture	⬟		111-113

📄 Catalog   ⬟ Framework/Tools   ✎ Templates/Examples

1. Key resources for each DAR development step (I / III)

Resource relevance for DAR development steps

Input type	Key resources (link)	Description	1. Diagnostic assess.	2. Use case prio.	3. Vision Vision dev.	4. Roadmap dev.	5. Impl. planning	Stakeholder engt.
Global/regional articles & reports	AGRA: Select country profile reports (link)	In-depth analyses of specific African countries, focusing on their agricultural agricultural sectors	✓					
	FAO: Country reports (link)	Country reports on agricultural and food security activities	✓					
	Beanstalk: State of the Digital Agriculture Sector Across Across Agricultural Value Chains in Low- and Middle- Middle-Income Countries (link)	Overview of the digital agriculture landscape in LMICs, highlights growth, growth, challenges, and opportunities within the digital ag space	✓	✓				
	FAO: Status of Digital Agriculture in 47 Sub-Saharan Saharan African Countries (link)	Analysis of the current digital agriculture landscape across 47 African countries	✓	✓				
	The Commonwealth: State of Digital Agriculture in the the Commonwealth (link)	Comprehensive report detailing the digital agriculture landscape within within Commonwealth nations	✓	✓				
	CTA: The Digitalisation of African Agriculture Report 2018-2019 (link)	Report that explores how digital can transform agriculture in Africa while while addressing systemic challenges	✓	✓				
	GSMA: Digital Agriculture Maps: 2020 State of the Sector Sector in Low and Middle-Income Countries (link)	Analyzes the current landscape and adoption of digital agriculture services services across LMICs	✓	✓				
	World Bank Digital Agriculture Country Profiles (link)	Select country analysis of digital agriculture ecosystems and enabling policies	✓	✓				
	A Digital Public Infrastructure Approach for the Agriculture Sector by World Bank (Draft paper 2025)	It discusses the DPI approach and agriculture-specific building blocks required to leverage the DPI approach in the sector	✓	✓	✓	✓	✓	
	CGIAR climate-smart agriculture country profiles (link)	Assessment of specific countries focusing on the state of the agriculture sector and opportunities for climate smart agriculture	✓	✓				
	Mercy Corps: Research and Resources (link)	Market intelligence in agriculture and ag-tech, with case studies, impact evaluations, reports, and other technical documents	✓					
	Briter: Resource Hub (link)	Real-time data, sector-specific insights, and a directory of deals, businesses, investors, etc. in the startup ecosystem	✓					
	AgBase: Research and Insights Hub (link)	Business intelligence platform with real-time data, market insights, and a hub for information on agtech and foodtech across emerging markets	✓					
National documents	Digital agriculture policies from agriculture ministry	Official government policies guiding digital transformation in agriculture	✓	✓	✓			
	Regulatory policies from ICT ministry	Regulations governing digital tools, data privacy, and ICT use in country	✓	✓	✓			
	National agriculture policies	Broader national policies on agricultural development	✓	✓	✓			

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Digital Agriculture Roadmap (DAR) Playbook

1. Key resources for each DAR development step (II / III)

Input type	Key resources (link)	Description	Resource relevance for DAR development steps					
			1. Diagnostic assess.	2. Use case prio.	3. Vision dev.	4. Roadmap dev.	5. Impl. planning	Stakeholder engt.
Funder documents	AgFunder AgriTech Investment Reports (link)	In-depth analysis of investment trends in Africa's agrifood technology sector	✓					✓
	Devex funding tracker (link)	Consolidated tracker with information on funding priorities and partnering organizations across various sectors	✓					✓
	Specific funder documents	Reports, guidelines, strategies, or funding frameworks that outline funding priorities and eligibility criteria	✓					✓
Databases	Ministry of Agriculture statistics	National datasets on agricultural production, trade, and digital agriculture adoption	✓					
	USDA: Foreign Agriculture Service (link)	Global agricultural trade and commodity data	✓					
	FAO stat (link)	Open-access agricultural data on production, trade, and market trends	✓					
	World Bank DataBank (link)	Platform that contains collections of time series data on a variety of topics including agriculture	✓					
	UN Comtrade (link)	International trade statistics, including agricultural imports and exports	✓					
Frameworks and tools	SAID framework for digital agriculture ecosystem mapping (link)	Map of key components across the digital agriculture ecosystem	✓					
	SAID digital agriculture ecosystem maturity model (link)	Model that assess the maturity of a country's digital agriculture ecosystem by benchmarking it against 14 other regions	✓					
	Use case prioritization matrix (link)	Structured tool to assess and rank potential use cases based on key criteria		✓				
	60 Decibels Digital Agriculture Index (link)	Tool designed to measure the impact and effectiveness of digital agriculture solutions on smallholder farmers						✓

1. Key resources for each DAR development step (III / III)

			Resource relevance for DAR development steps					
Input type	Key resources (link)	Description	1. Diagnostic assess.	2. Use case prio.	3. Vision dev.	4. Roadmap dev.	5. Impl. planning	Stakeholder engt.
Templates and examples	Governance structure for DAR implementation (link)	Illustration of the governance structure for DAR implementation in Ethiopia					✓	
	Initiative charter for each prioritized use case (link)	One-pager that summarizes the description of initiatives, key activities for implementation, and pilot programs					✓	
	Workplan for DAR implementation (link)	Outline of the timeline, key activities, and milestones required to implement enabling initiatives					✓	
	Interview guide for key stakeholders (link)	Key questions for stakeholders (donors, private sector, farmer focus groups) to gather input and expertise utilized in the DAR development	✓					✓
	Convening agenda for DAR development (link)	Agenda for convenings which focuses on gathering input on use cases and aligning on a shared vision						✓
Global resources	Ongoing initiatives	List of ongoing global digital agriculture initiatives					✓	✓
	Potential funders and partners	List of potential funders and implementing partners in the digital agriculture space					✓	✓
Existing toolkits	IFAD: Digital Agriculture Landscape Assessment Toolkit (link)	Guide developed by IFAD to assess digital agriculture ecosystems	✓					

Digital Agriculture Roadmap (DAR) Playbook

2. SAID digital agriculture ecosystem map

What this is

The Digital Farmer Services Systems Analysis and Investment Design (SAID) Framework serves as a practical guide for mapping the digital agriculture ecosystem of a country or region. It can be tailored to reflect country-specific priorities, including desired impact and user needs.

This framework is useful during desk research and stakeholder interviews to ensure a comprehensive view of the ecosystem. It helps organize insights across five key areas:
• Impact
• Users
• Use case areas
• Digital stack
• Enabling environment

Mapping findings against these categories supports a holistic understanding of the ecosystem.

Impact

1 Increase productivity	2 Improve SHF HH income	3 Improve nutrition	4 Improve women's empowerment in agriculture	5 Improve resilience

Core AgDev Strategic impact Goals

Priority, but not a current AgDev Strategic Goal

Users

Smallholder Farmers / Small Scale Producers	SMEs & Private Sector	NGOs, Social Sector & Multilaterals	Government & Public Sector

Solutions

Advisory & Extension Services	Smart Farming	Financial Services	Pricing & Market Services	Supply Chain Management	Ag Intelligence

Digital Stack

User Facing Layer (Applications & Tools)	Information *(incl. crop, pricing, market, weather, etc.)*	Transactions *(incl. credit, input delivery, warehouse receipts, etc.)*	Delivery Technologies *(incl. IVR, SMS Farm Radio, etc.)*
Integration Layer (Platforms & Pathways)	Integration Features *(incl. secure gateways, standards & interoperability, etc.)*	Analytics Layer	Functions *(incl. enrollment patterns, credit algorithms, etc.)*
Data & Content (Agriculture & Adjacent)	Farmer Related *(incl. farmer registries, financial history, etc.)*	Productivity Related *(incl. soil registries, weather data, etc.)*	Market Related *(incl. price data, trade data,, etc.)*

Enabling Environment

Technologies *(incl. blockchain, AI, machine learning, etc.)*	Digital Infrastructure *(incl. mobile penetration, broadband, cloud services, etc.)*	Agricultural Markets *(incl. Inputs, value addition capabilities, trade barriers, etc.)*	Physical Infrastructure *(incl. roads, migration, cell towers, aggregation centers, etc.)*
Government and Policy *(incl. ICT policy, data policy, digital agriculture initiatives, farmer support, etc.)*		Human Capital & Infrastructure *(incl. gender and social structure, literacy levels, user engagement and trust, etc.)*	

Note: This view has been built based on The Digitalization in African Agriculture Report, 2019, as well as a joint BCG- Omidyar Network India publication, AGRI Node :Open Digital Ecosystem (ODE) Concept Paper, 2020 to be published
Source: DFS-SAID framework, Gates Foundation

3. SAID digital agriculture ecosystem maturity model

The SAID Maturity Model was developed as a tool to assess the maturity of a country's digital agriculture ecosystem. The model is built in Excel and consolidates key global indexes to evaluate different elements of the digital agriculture ecosystem:
- Strength and maturity of the digital ecosystem
- Maturity and scale of agriculture systems
- Innovation capacity
- Political economy and business enablement
- Current levels of inclusion

Based on user inputs, it assigns a maturity score from Stage 1 to Stage 4, with the following definitions:
- Stage 1: Regions requiring significant foundational investments across agricultural systems, enabling environment, and digital infrastructure
- Stage 2: Regions with limited digital infrastructure but experiencing a turning point in digital agriculture, driven by public or private sector momentum
- Stage 3: Regions with moderate digital infrastructure and innovation capacity, showing strong impact potential and clear public- or private-led pathways to scale
- Stage 4: Regions with relatively mature digital infrastructure and/or innovation ecosystems, well-positioned to test and scale advanced digital agriculture solutions

To use the model, users can update the underlying indicators with the latest data for their own country and selected comparator regions. The model is limited to countries that are included in the global indices used to populate the tool. *For more information on the SAID maturity model and other SAID tool, reach out to the authors of the DAR Playbook.*

Source: DFS-SAID framework, Gates Foundation

Overview of the 4-stage maturity model and their high-level characteristics

Deep dive on the key differences across the various stages of maturity

Quantitative and qualitative indicators used to determine model archetypes

Digital Agriculture Roadmap (DAR) Playbook

4. Use case prioritization matrix

Illustrative

A prioritization matrix is a structured tool to assess and rank potential use cases based on key criteria. General steps:

- Establish clear criteria for prioritization, such as impact and feasibility
- Use an Excel-based scoring tool to assess each use case:
  - Identify indicators for each criterion e.g.:
    - **Impact**: Potential income increase, estimated output growth, farmer reach
    - **Feasibility**: Time to implementation, number of existing initiatives
  - Assign numerical scores to each indicator based on predefined scales (e.g., 1–5) leveraging expert input and desk research
  - Plot the results on the prioritization matrix
- Identify which use cases fall into the highest priority quadrant and should be prioritized

SF1. Improve crop varieties
SF2. Use & maintain farm machinery
SF3. Irrigate crops
SF4. Dispose of & manage farm waste
FS5. Access credit
FS6. Lease or purchase machinery
FS7. Access to insurance
FS8. Access investment
FS9. Access to mobile banking & money
PM10. Manage business activities
PM11. Access better markets & buyers
PM12. Understand up-to-date transparent pricing for products
PM13. Assure quality of outputs
PM14. Sort and grade output
SC15. Track and trace inputs
SC16. Transport & store outputs safely
SC17. Track and trace output inventory
AI18. Deliver timely interventions to protect crops or livestock
AI19. Develop carbon and climate credentials for markets
AI20. Improve livestock management
AI21. Procure and distribute inputs

Legend:
- **SF** Smart Farming
- **FS** Financial Services
- **PM** Pricing & Market Services
- **SC** Supply Chain Management
- **AI** Agricultural Intelligence

5. Implementation governance structure example

What this is

- Illustrative example of the governance structure for the Ethiopia DAR
- The governance team sits under the Ministry of Agriculture and in the long-term will evolve into a permanent fixture

How to use it

- Determine the essential entities responsible for governance
- Assign clear ownership and accountability
- Establish reporting lines, responsibilities, and decision-making processes

Digital agriculture steering committee

Ensure coordination and alignment to MoA policies and standards, broader alignment to cross government initiatives and the Digital Ethiopia 2025 strategy

| Federal Minister of Agriculture | Select members of the Ministry of Agriculture | State Agriculture Ministers | CEO, Agriculture Transformation Institute | Gates Foundation |

Digital agriculture unit

Ownership of DAR, strategic planning and facilitation of interactions with other government agencies on DAR

Ministry of Agriculture

ATI analytics team

Analytical support and support with project development piloting and wider implementation

Agriculture Transformation Institute

External Coordination sub committee

Platforms to streamline digital agriculture efforts leveraging REDFS, and prevent initiative duplication

| Lersha | Hello Tractor | GIZ | Digital Green |

Data governance sub committee

Make recommendations on policy around data collection, governance and sharing

| GIZ | Digital Green |

Digital agriculture subcommittees

Non-exhaustive participants

Source: Ethiopia Digital Agriculture Roadmap

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Digital Agriculture Roadmap (DAR) Playbook

6. Initiative charter

What this is

- Illustrative example of an initiative charter which serves as a high-level blueprint of initiatives for each prioritized use case and other key initiatives across the digital stack and enabling environment

- Provides a structured outline detailing the objectives, key activities, budget and more

- *See next page for a template*

Example initiative charter

Improve livestock management (I/III)

Description	• Support farmers to track and monitor livestock locations to plan optimal water and pasture routes, develop breed and health insights and improve breeds through artificial insemination
Objectives	• Digitise livestock records and better monitor health, production and productivity of livestock • Ease national delivery of livestock specific interventions

Lead owner	MoA (Livestock division)
Proposed pilot	• Pilot in Oromia and collect livestock output data via USSD • Send farmers SMS updates on optimal grazing and water paths, informed by ground research and satellite verification
Key performance indicators	• Interoperability across all 5 core livestock data system • 50% reduction in livestock mortality rate

Governance structure

Name	Role
MoA (livestock division)	Project lead
ATI	Project management
Regional BoAs	Mobilisation support
ESSTI[1]	Data verification via satellite
Ethiopian Mapping Agency	On the ground water and paster mapping

Budget estimate

Item	Source	USD (appx)
One-off	Donors	$5M[2]
Ongoing (annual)	Government	$100K[3]
Total		**$5.1M**

Key activities and decision points

Top Activities

| | Timing |
| | '24 '25 '26 '27 '28 '29 '30 |

1. **Initial planning and resource mobilization**
   – Study global benchmarks for best practice and input on strategy and decide on pilot location
   – Mobilize necessary financial resources government and donors

2. **Development of necessary partnerships, capacity and infrastructure**
   – Sign MoUs with critical mobile network operators, software developers, and government stakeholders
   – Procure the required equipment and information architecture to facilitate information and data exchanges

3. **Pilot roll out monitoring and evaluation**
   – Roll out of USSD data collection and SMS information distributions network to target pilot areas
   – Develop applications to improve use experience and Interoperability

Critical interfaces and dependencies with initiatives

Inputs	Category	Outputs	Category
• Farmer profiles and unique IDs • Digtal literacy for farmers and DAs • Device access for extension workers	Data & content Human capital Digital infrastructure	• Deliver timely interventions • Access credit and insurance • Manage farm business activities	**Agriculture intelligence** **Financial services** **Pricing and markets**

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Digital Agriculture Roadmap (DAR) Playbook

6. Initiative charter template

Lead owner	*Add the organization responsible for execution*

Description	*Briefly describe the use case, including its purpose and expected benefits*

Proposed pilot	*Outline pilot programs to be launched*

Objectives	*Outline the key goals of the initiative*

Key performance indicators	*Outline measurable metrics that define success*

Governance structure

Name	Role
List key stakeholders involved in execution	Define responsibilities in execution
Xx	Xx
Xx	Xx

Budget estimate

Item	Source	USD (appx)
One-off	Add source of funding	Add initial costs of implementation
Ongoing **(annual)**	xx	Add recurring costs of implementation
Total		Xx

Key activities and decision points

Name	Timing
	'24 '25 '26 '27 '28 '29 '30
1. List major activities/milestones and projected timelines	
2. Xx	
3. Xx	

Critical interfaces and dependencies with initiatives

Inputs	Category	Outputs	Category
Highlight the **initiatives required** to enable the use case and their supporting **category layer** in the **digital stack and enabling environment**	Xx	Identify which **use cases depend on the success of this initiative** and their **respective use case area**	Xx

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7. Example work plan for DAR implementation

Below is an example of a high-level workplan for DAR implementation with timeline, key activities, and milestones

2024 — 2025 — 2026 — 2027 — 2028

Phases

Pilot: Test priority use cases and lay the foundation for digital systems

Build: Strengthen digital systems, expand capacity, and prepare for scale

Scale: Expand successful use cases across regions and deepen system integration

Digital stack

Design and test MVPs[1] of digital tools

Build in-house or contracted analytics and data management capacity

Use existing data sources (e.g., land records, zone data) to support pilots

Begin broader data collection to support decision-making and monitoring
- Refine user interfaces and system performance based on feedback

Set up basic data flows and infrastructure to enable analytics

Develop the full data system architecture, including APIs[2] and server infrastructure

Enabling Environ.

Develop data policy frameworks & standards and socialize with stakeholders

Build long-term government and partner capacity to manage and maintain the systems

Train early frontline users (e.g., Digital Advisors or extension agents) on tools and processes

Roll out devices and training to more frontline users or users

Onboard initial partners (e.g., cooperatives, input providers, training institutions)

Milestones

Pilot launched

Partners onboarded Data stack built

Pilot phase   Build and scale phases

1. Minimum Viable Product; 2. Application Programming Interface

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8. Example interview guides – Donors

Below is an example of an interview guide for donors, designed to gather insights on the current state of the digital agriculture ecosystem, identify donor priority areas, and understand the donor's role and contributions

Objective of interview
- To understand the donor's contribution to the digital agriculture ecosystem
- To understand the challenges facing the delivery of digital agriculture services from the point of view of donors
- To understand what possible interventions (new or previously implemented) can solve these challenges
- To understand the greatest priorities for donors as well as any specific 'no-gos'

Stakeholder role or plans
1. What digital solutions or enablers does your organization currently provide or is planning to provide for agriculture?
   a) Which of these use case areas are your solutions targeting?
      o Agricultural intelligence
      o Smart farming financial services
      o Pricing and market services
      o Supply chain management
   b) Could you explain in more detail how the solutions work?

2. What do you see as the highest priorities in digital agriculture solutions?
   a) Which use case areas do you see as most important?
   b) Within this, which use cases do you believe are or seem highest priority?
3. If you were to consider funding a use case or project in this space, what details or data points would be required to invest or fund e.g., business case elements?

Enabling Environment
1. In the digital agriculture enabling environment, which of these areas have the greatest challenges or are highest priority? Why?
   o Digital infrastructure
   o Physical infrastructure
   o Agriculture markets
   o Government and policy
   o Human capital
2. In your experience, what do you see as required to overcome these challenge?

Digital & Data Ecosystem
1. In your experience, where do the biggest gaps exist within the digital stack (e.g., data availability, integration features, analytics, or transaction systems), and what solutions do you think could improve connectivity and functionality across these layers?

Farmer demand
1. What are farmers' highest priorities in terms of digital agricultural services and support, in your view or experience?
2. Are farmers aware of any digital services/platforms?
3. What are the most important components of digital services that farmers could benefit from, in your view or experience?
4. What are the most important interventions you would propose to improve the uptake and adoption of digital services among the farming population?

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8. Example interview guides – Private sector

Below is an example of an interview guide for private sector actors, designed to gather insights on their role in digital agriculture, the challenges they face, and their priorities and contributions to the broader ecosystem

Objective of interview

- To understand the role private sector actors play in the digital agriculture ecosystem
- To identify challenges the private sector faces regarding human capital, access to finance, regulations, and infrastructure
- To understand the challenges facing the full agricultural value chain from the point of view of private actors
- To understand what possible digital interventions or solutions (new or previously implemented) can solve these challenges

Stakeholder role or plans

1. What kind of digital services do you (plan to) provide?
2. Do you have any plans to get into digital agriculture?
3. Which of these use case areas do you (plan to) service?
   a) Agricultural intelligence
   b) Smart farming
   c) Financial services
   d) Pricing and market services
   e) Supply chain management
4. What do you see as the highest priorities in digital agriculture solutions?
   a) Which of the use case areas do you see as the most important?
   b) Within this, do you have any high priority use cases?

Farmer demand

1. What are farmers' highest priorities in terms of agricultural services and support, in your view or experience?
2. Are farmers aware of any digital services/platforms (ideally beyond extension)?
3. What are the most important components of digital services that farmers could benefit from, in your view or experience?
4. What are the most important interventions you would propose to improve the uptake and adoption of digital services among the farming population?

Enabling Environment

1. What are the top three policy challenges you face when you (try to) provide digital/digital agriculture services?
   a) What are the top interventions you would recommend to solve these challenges?
2. In terms of physical and digital infrastructure, what do you see as the main challenges?
   a) What are the top interventions you would recommend to solve these challenges?
3. In terms of human capital, what main system-level challenges do you observe in providing digital services?
   a) What are the top interventions you would recommend to solve these challenges?

Digital & Data Ecosystem

1. Today, is there any data integration across different stakeholders, particularly between government and private actors?
2. What more can be done to improve different platforms' integration for a unified digital agriculture ecosystem?
3. Which cross-sectoral digital platforms are critical for digital agriculture services?
4. What are the top three challenges you face when you try to provide digital/digital agriculture services?
5. Are you aware of any innovations in the pipeline that can support digital agriculture services?

Digital Agriculture Roadmap (DAR) Playbook

8. Example interview guides – Farmer focus groups

Below is an example of a focus group discussion guide for farmers, aimed at understanding their key challenges, identifying p riority needs and opportunities for digital solutions, and exploring current levels of engagement with digital tools

Objectives

- To understand the key challenges smallholder farmers face in their daily operations
- To identify digital needs and opportunities that can enhance farming and livestock management
- To assess farmers' current engagement with digital tools and their effectiveness in addressing agricultural challenges

Challenges

1. What are your greatest challenges in:
   a) Planning
   b) Inputs
   c) Production
   d) Financial services and access to financial services
   e) Pricing and markets
   f) Supply chain (logistics etc.)
2. Which of these categories has the most difficult challenges?

Solutions

1. If you had to prioritize, which of these challenges would you want solutions for?
   a) What would these solutions be?
   b) [If these are not digital] What would a digital solution be?

2. For each of these areas, what would your highest priority solution be? And digital solution?
   a) Planning
   b) Inputs
   c) Production
   d) Financial services and access to financial services
   e) Pricing and markets
   f) Supply chain (logistics, etc.)
3. Which of these do you think would have the most impact on your income and production?
4. What, if anything, has stopped you adopting solutions in these areas the past?
5. In your opinion, what could help solve this and enable adoption?

Digital Agriculture Roadmap (DAR) Playbook

9. Example DAR development convening agenda (I / II)

Example convening agenda for national convening which focuses on gathering input on use cases and aligning on a shared vision

Day 1 agenda		
	Welcoming & opening remarks	09:00 – 09:15
	Introduction to DAR and Convening objectives	09:15 – 09:30
	Digital agriculture maturity assessment	09:30 – 10:00
	Visioning exercise	10:00 – 11:00
	Coffee break	11:00 – 11:20
	Presentations on national digital agriculture success stories	11:20 – 13:00
	Lunch	13:00 – 14:00
	Use case prioritization breakout session	14:00 – 16:20
	Presentations from breakout sessions	16:20 – 16:50
	Day 1 wrap-up, next day agenda & closing remarks	16:50 – 17:00

Day 2 agenda		
	Welcome remarks	09:00 – 09:15
	Align on highest priority use cases	09:15 – 09:45
	Introduction to the digital stack and enabling environment	09:45 – 10:45
	Coffee break	10:45 – 11:00
	Presentations on national digital systems and enabling environment initiatives	11:00 – 12:20
	International benchmark case studies	12:20 – 13:00
	Lunch	13:00 – 14:00
	Breakout session on digital stack and enabling environment	14:00 – 16:20
	Breakout group presentations	16:20 – 16:50
	Closing remarks	16:50 – 17:00

Source: Ethiopia Digital Agriculture Roadmap

Digital Agriculture Roadmap (DAR) Playbook

9. Example DAR development convening agenda (II / II)

Example convening agenda for national convening which focuses on alignment around a refined version of the roadmap

Partner convening agenda	Welcoming & opening remarks	09:00 – 09:30
	Overview of DAR	09:30 – 09:45
	Local and international best practice sharing (I/II)	09:45 – 10:45
	Coffee break	**10:45 – 11:05**
	Local and international best practice sharing (I/II)	11:05 – 12:00
	Sharing draft Digital Agriculture Roadmap	12:00 – 12:45
	Lunch	**12:45 – 14:00**
	Introduction to breakout sessions	14:00 – 14:10
	Prioritized use case & enabling initiative breakout session 1	14:10 – 15:40
	Coffee break	**15:40 – 16:00**
	Prioritized use case & enabling initiative breakout session 2	16:00 – 17:30
	Convening wrap up	17:30 – 18:00
	Networking session	**18:00 – 19:00**

Source: Ethiopia Digital Agriculture Roadmap

Digital Agriculture Roadmap (DAR) Playbook

10. MEL Framework Resources

Four implementation aspects		Key considerations or option spaces				Remarks
Methodology	Techniques	Metrics tracking	Proxy data	Interviews	Trials	Techniques to be decided with partners based on measurement type, resources, and capabilities
	Tools	Excel and shared drive		All-in-one application/software/platform		Basic shared drive and excel capturing important data to keep process simple and affordable
	Processes and cadences	• Kick-off meeting and initial alignment meeting • Regular touchpoints with partners		• Periodic project evaluation and lookbacks • Ad-hoc meetings		Important to align on processes and cadence early with partners

	Measurement	Monitoring	Evaluation	Learning	Reporting	
Roles and responsibilities	Client and Partners joint effort	Client-led	Client and Partners joint effort	Client and Partners joint effort	Client	Collaboration and co-ownership with partner is critical

				Remarks
Baseline	Use of secondary data	Expert interviews	On-the-ground rapid assessments (lack of data)	Methodology to de decided based on data availability[1]
Frequency	By tranches	Periodic	Ad-hoc	Real-time	Real-time collection requires sophisticated and costly technology

1. If secondary data is available, it is good practice to triangulate these findings with expert interviews with sufficient knowledge on program scope

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11. Example use cases

Ag advisory & intelligence	Smart farming	Financial services	Pricing & Market services	Supply chain management
Plan crop and livestock breed selection, timing and practices	Regulate microclimate conditions for optimized production	Access savings and investments	Access up-to-date transparent pricing for products	Track & trace input supply
Examine health, pests and growth	Monitor crops & livestock in real-time	Access affordable credit and capital	Access markets & equitable trade	Transport outputs in a timely and secure manner
Access & properly apply inputs	Administer inputs with precision	Access crop & livestock insurance	Sort & grade products	Store harvested produce under optimal conditions
Access affordable mechanization	Dispose of and manage production waste	Access secure & timely payments		Track & trace crop output
Optimize land & resource utilization				Track & trace livestock

Digital Agriculture Roadmap (DAR) Playbook

11. Example use case definitions (I / III)

Solution area	Use case	Description	Examples of solutions
Advisory & extension services	Plan crop and livestock breed selection, timing and practices	• Identify the most suitable crops or livestock breeds, determine when to plant or rear them, and choose appropriate production methods	• Farmer simulation models • Advisory platform for planning cropping
	Monitor for health, pests and growth	• Enables early detection and management of crop diseases, pest infestations, and livestock health issues, reducing losses and improving overall farm productivity	• AI-powered crop monitoring apps
	Access and properly apply inputs	• Ensures farmers can easily obtain and apply quality inputs such as seeds, fertilizers, and pesticides, improving efficiency and supporting better yields	• Digital advisory platform which recommends and provides inputs
	Access affordable mechanization	• Provides farmers with access to cost-effective mechanization options, helping to increase efficiency, reduce labor intensity, and improve production capacity	• Digitally-enabled smart shared assets • Tractor-sharing platforms
	Optimize land and resource utilization	• Promotes efficient use of land, soil, and water resources, ensuring sustainable farming practices that enhance long-term productivity	• Agricultural land optimization model
Smart farming	Regulate microclimate conditions for optimized production	• Efficiently optimize temperature, humidity, light levels, and nutrient delivery in greenhouse for efficient and high-yield greenhouse farming	• Automated climate control systems • IoT-based remote greenhouse monitoring
	Monitor crops & livestock in real time	• Continuously track the health, growth, and conditions of crops and animals to support timely decisions, reduce losses, and improve productivity	• IoT Soil Moisture & Nutrient Sensors • Smart sensors for animal health monitoring
	Administer inputs with precision	• Apply seeds, water, fertilizers, and other inputs in the right amounts, at the right time and place, to maximize efficiency and improve yields	• Smart irrigation equipment monitoring • Drone-enabled agrochemical spraying systems
	Dispose of and manage farm waste	• Focuses on proper handling, recycling, and repurposing of agricultural waste, ensuring environmental sustainability and resource efficiency	• IoT-powered waste monitoring and auto-composting systems

Digital Agriculture Roadmap (DAR) Playbook

11. Example use case definitions (II / III)

Solution area	Use case	Description	Examples of solutions
Financial services	Access savings and investments	• Enabling farmers to build financial resilience by accessing tailored savings products and investment opportunities that support agricultural growth, risk mitigation, and long-term sustainability	• Targeted digital savings products
	Access affordable credit and capital	• Ensure farmers can obtain necessary agricultural inputs, machinery, land etc. on favorable credit terms to support production and agribusinesses can access capital to run their activities	• Mobile-enabled farmer credit card system • Digitally-enabled Pay-As-You-Go (PAYG) fertilizer & credit bundling
	Access crop & livestock insurance	• Ensure farmers have access to risk protection mechanisms to safeguard their production and income from unexpected losses	• Index insurance platform • Digitally-enabled indemnity insurance schemes for livestock
	Access timely and secure payments	• Ensure farmers are able to receive and make payments for produce, inputs, & services in a reliable, traceable, and timely manner	• Mobile money platforms (e.g., M-Pesa, Airtel Money) • Digital wallet solutions for cooperatives and aggregators
Pricing & market services	Access up-to-date transparent pricing for products	• Ensure farmers can access reliable and up-to-date price information for their produce to improve market decisions	• AI-enabled demand forecasting for market prices, Mobile-phone based price and market information delivery
	Access markets & equitable trade	• Ensure farmers can sell their produce in structured, transparent, and equitable markets	• Fair-trade and similar digital certification, • Digital-enabled marketplace system from lot-generation, quality assaying, auctions, payments & settlements
	Sort & grade products	• Support farmers to get a measure of the quality of their output both in general and in relation to the overall harvest of that particular season, and enable them to receive targeted advisory where quality is lower	• AI robot sorting and Photo recognition software • Live output quality database

Digital Agriculture Roadmap (DAR) Playbook

11. Example use case definitions (III / III)

Solution area	Use case	Description	Examples of solutions
Supply chain management	Track & trace input supply	• Ensure inputs such as seeds and fertilizers are monitored and verified to guarantee quality and authenticity	• Digital-input verification tools
	Transport outputs in a timely & secure manner	• Ensure produce is transported efficiently and safely from farms to markets or storage facilities	• Mobile-based B2B food supply platforms
	Store harvested produce under optimal conditions	• Ensure agricultural products are stored properly to maintain quality and reduce losses	• Cold Storage Monitoring with IoT Sensors
	Track & trace crop output	• Support buyers of agriculture produce with efficient, automated, transparent logistics and distribution solutions at a fair price	• Electronic warehouse receipt systems • Blockchain-Based Traceability
	Track & trace livestock	• Follow the movement and location of livestock across the supply chain to ensure traceability, for better market access	• Smart livestock tracking and geotagging (along with sensors for fertility, disease and other key metrics)

Digital Agriculture Roadmap (DAR) Playbook

11. Use case and solution library

What this is

- A database of 100+ use cases and solutions has been developed through desk research and experience developing DARs in Odisha, Ethiopia, and Kenya

- The database is available upon request

Digital Agriculture Roadmap (DAR) Playbook

12. Emerging insights on Digital Public Infrastructure for Agriculture (I / III)

What this is

- Digital public infrastructure (DPI) is systems, software, or platforms that are foundational, digital building blocks created for the public benefit

- It offers a paradigm shift from a siloed sectoral approach to a whole-of-government digitalization approach through re-usable, modular, and interoperable building blocks

- Common Foundational DPI: Digital IDs, Digital Fast Payment Systems, and Data sharing Capabilities

- *See the next page for DPI applications in agriculture*

Illustrative Value for Ecosystem Stakeholders

Farmers	Investors	Producers	Agri-Business	Governments
Have unlimited access to targeted advisory services on-demand	Utilize certified data to derisk investment and improve return	Can trace provenance to demonstrate compliance with sourcing regulations	Leverages a wide variety of innovations to improve value chain performance	Make import, trade, and subsidy decisions based on current market context

Digital Agriculture Services and Applications

Sector Specific Building Blocks (Agriculture)

Foundational DPI Building Blocks

Technology Infrastructure

Digital Agriculture Roadmap (DAR) Playbook

12. Emerging insights on Digital Public Infrastructure for Agriculture (II / III)

Market Discovery and Linkage

DPI-Enabled Applications and Services
Built with combinations of foundational and sector-specific building blocks as well as other DPGs as needed

Farmer Profiles

Digital Agri-Finance

Traceability

Advisory Services

Use-case specific content, AI models, and software applications

Sector-specific Data Exchange Layer - enables data exchange with sector-specific building blocks

Sector-specific building blocks

Farmer, Plot, Crop, and Product Registries
- Farmer registry
- Plot registry
- Crop sown registry
- Product registry

Ag Data Exchange Standards, Protocols, and Terminologies
- Ag-specific data standards and exchange protocols
- Data dictionaries, terminology services, and ontologies for agriculture content
- Logistics tracking and traceability standards for ag products

Agricultural Data Services
- Crop health surveillance
- Soil Maps
- Pest and disease surveillance
- Market data

AI Assets for Agronomy Advisory
- Multi-modal agronomy content repositories
- Agriculture-specific, localized small language models
- Q&A pairs for evaluation of ag common questions

Data Exchange Layer - enables data exchange with foundational DPI building blocks

Foundational DPI building blocks

- Object and Entity Registries (e.g., civil registry, land registry)
- Authentication protocols
- Single Sign on Protocols

- Transaction protocols
- Financial account Mapper
- Payment APIs

- Consent Protocols
- Digital Signatures
- Public Key Infrastructure

- Open APIs
- Data standards
- Data exchange protocols

- Transaction network
- Purchasing protocols
- Service APIs

- API-Accessible location data
- API-Accessible weather forecasting service

- Multi-modal local language content repositories
- Evaluation data sets (golden Q&A)

| Identification | Digital Payments | Trust Frameworks | Data Exchange | Discovery & Fulfillment | Foundational Data Services | Language Localization |

Established DPI   Emerging DPI

Technology Infrastructure

Source: "A Digital Public Infrastructure Approach for the Agriculture Sector" by World Bank (Draft report to be published soon)

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12. Emerging insights on Digital Public Infrastructure for Agriculture (III / III)

Approach to considering DPI for DAR development

As part of the Diagnostic step of DAR development, evaluate the state of DPI and its applications for agriculture. This could include:

- Foundational DPI (Digital ID & e-signatures, Digital Payment systems, Data sharing capabilities of the government)
- Trust Ecosystem (Data privacy/protection, data sharing, consent laws)
- DPI Enablers (Data policy and standards, Accessible APIs)
- Agriculture Registries and Datasets (Farm registry, farmer registry, market data information, agriculture product registries)
- Sector-specific Data Exchange Standards, Protocols, and Terminologies (Data standards for agriculture data, data exchange protocols, terminology services)
- Core Data Services for Agriculture
- AI Assets for Agronomy Advisory

As part of the Use Case Prioritization, consider where foundational DPI or the DPI approach can be useful. For example, a priority use case might be agro-financing: Secure and inclusive issuance of agricultural input loans, insurance and risk mitigation products, savings solutions, market transactions, and financial analytics. Relevant building blocks:

- Ag building blocks: farmer registry data to inform eligibility for subsidies and other schemes, agriculture data exchange to share data across registries
- Cross-sectoral building blocks: fast payments systems to facilitate execution of transactions, digital identity, eKYC, verifiable credentials to support authentication and authorization, transaction protocols, eInvoicing

Source: Kenya DAR (Ongoing 2025)

Example from ongoing DAR development in Kenya

Digital Agriculture Roadmap (DAR) Playbook

13. Emerging insights on AI for Agriculture (I / III)

What this is

- AI is transforming the agri-food sector, enhancing sustainability, productivity, and food security

- AI in agriculture is expected to grow from $1.5B in 2023 to $10.2B by 2032 (CAGR 24.5%)

- Global investment in generative AI has skyrocketed from less than $5 billion in 2019 to over $20 billion in 2023

Prerequisites of AI in Agriculture

Network Infrastructure

Mobile broadband, cloud computing, 5G, and edge computing enable real-time AI services; bridging the connectivity gap is essential for rural adoption

Data & Policy Governance

Standardized, interoperable data systems with ethical governance ensure responsible, inclusive AI use and secure data sharing

Public-Private Partnerships

Collaborative models accelerate AI innovation, scale last-mile solutions, and unlock inclusive economic value by bridging public sector reach with private tech capacity

Energy Infrastructure

Reliable, sustainable power is crucial for running AI infrastructure; energy access remains a major constraint in LMICs

Digital Literacy & Human Capital

AI adoption depends on training rural users and building local expertise across agriculture and tech sectors

Digital Agriculture Roadmap (DAR) Playbook

13. Emerging insights on AI for Agriculture (II / III)

Approach to considering AI for DAR development

As part of the Diagnostic step of DAR development, one can assess a country's readiness and capacity to integrate AI in agriculture, then develop a clear roadmap for implementation. These steps could include:

1. Landscape Assessment
- Review existing digital infrastructure, datasets, and AI policies
- Analyze regulatory alignment, public-private partnerships, and innovation ecosystems

2. Stakeholder Mapping & Engagement
- Identify and engage key players: government, academia, private sector, farmers, and civil society
- Use participatory workshops and surveys to gather inputs

3. AI Readiness Evaluation
- Assess technical capacity, data availability, and digital literacy
- Map existing agri-tech solutions and institutional capabilities

4. Gap Analysis
- Identify critical gaps in data, infrastructure, human capital, and funding

5. Roadmap Development
- Develop a phased strategy aligned with national priorities and digital public infrastructure
- Define short-, medium-, and long-term AI interventions

6. Validation & Iteration
- Present findings for stakeholder feedback
- Refine based on iterative consultations

Digital Agriculture Roadmap (DAR) Playbook

13. Emerging insights on AI for Agriculture (III / III)

Investment priorities for AI in Agriculture

Data Lab & Sandboxing
- Establish a Public-Private Data Lab for agriculture
- Enable AI model testing, experimentation, and responsible innovation
- Promote data sharing protocols and standards

Innovation Accelerator
- Launch AI-for-Ag Innovation Accelerator
- Support startups that use AI to enhance productivity, climate resilience, and market linkages
- Leverage existing accelerator platforms

Ecosystem Integration
- Embed AI components in current agricultural and digital transformation programs
- Promote interoperability with farmer registries, payment platforms, and advisory systems

Human Capital Development
- Invest in AI-focused curricula and certifications across agricultural universities, TVETs, and extension systems
- Build AI literacy for policymakers, extension agents, and farmers.

Additional considerations for integrating AI into DARs

Position AI as a horizontal enabler and a vertical use case
- Horizontal Enabler
  - AI integrated across advisory, market, and financial services
- Vertical Priorities
  - Include AI in prioritized use cases under the DAR's strategic framework

Link to DPI
- Use of Farmer, Land, Crop and Soil Registries to train AI models
- Payments & eKYC for AI-assisted finance access
- Integration with Digital Extension platforms
- Launch AI for Agri-Tech Accelerator and incubate and scale AI-powered agri-startups addressing farmer needs by connecting to digital public infrastructure (e.g., Farmer Registry, payment systems).

A Call to Action: Mobilize support and clarify next steps
- Invest in AI Readiness: Data, skills, policy
- Collaborate with Research and Private Sector: Bridge innovation with field realities
- Design Inclusive AI Systems: Local language, accessible formats, equitable access
- Include AI in Monitoring & Evaluation: Use AI for real-time tracking of DAR outcomes

Digital Agriculture Roadmap (DAR) Playbook

Appendix

Glossary of terms used in the Playbook (I / II)

Term	Explanation
Advisory & Extension Services	Systems and activities that provide information, training, and support to farmers and agricultural stakeholders to improve their knowledge, skills, productivity, and livelihoods.
Agtech	The use of technology in agriculture with the aim of improving yield, efficiency, and profitability.
AI / Generative AI (GenAI)	Advanced AI models capable of generating predictions or other data to enhance, automate, and optimize agriculture practices.
Digital agriculture	The use of digital technology and integrated systems to equip farmers and stakeholders with timely information, tools, and services across the agricultural value chain.
Digital Agriculture Roadmap (DAR)	A strategy, investment, and implementation plan for a country or region, intended to guide transformation of the agriculture sector using digital technologies. It outlines the country's context and needs, vision and goals, priority focus areas and use cases, specific, fundable initiatives, and implementation plan.
Digital Agriculture Unit (DAU)	A dedicated unit within the DAR country, often within the Ministry of Agriculture, established to manage the implementation of DARs, oversee coordination, and ensure accountability.
Digital Public Infrastructure (DPI)	Systems, software, or platforms that are foundational, digital building blocks created for public benefit. It offers a paradigm shift from a siloed sectoral approach to a whole-of-government digitalization approach through re-usable, modular, and interoperable building blocks. Includes digital IDs, digital fast payment systems, and data sharing capabilities.
Digital stack	The technical architecture in digital agriculture, comprising the user-facing layer (apps/tools), integration layer (platforms/APIs), and data/content layer (e.g., weather or soil data).
Enabling environment	The external conditions (e.g., policies, digital and physical infrastructure, human capital, markets) needed for implementation of digital agriculture solutions.
Funder circle	A coordinated mechanism to engage multiple donors and investors in funding DAR-aligned initiatives.

Note: For additional digital agriculture terminology, please refer to the glossary section of the "State of the Digital Agriculture Sector" Report.

Digital Agriculture Roadmap (DAR) Playbook

Glossary of terms used in the Playbook (II / II)

Term	Explanation
Initiatives	Specific, fundable solutions or programs developed within a DAR to deliver on priority use cases.
Interoperability	The capacity of digital tools and platforms to work together seamlessly and share data across systems.
Priority enabling initiatives	Specific, actionable, investible initiatives or solutions in the digital stack or enabling environment that support multiple use cases, such as digital literacy training or data infrastructure.
Priority use case initiatives	Specific, actionable, investible initiatives or solutions designed to enable a use case (e.g., building a credit scoring system to support farmer finance access).
Priority use cases	Use cases that have been prioritized by the country, often based on impact and feasibility, and for which initiatives should be designed under the DAR.
Project Management Unit (PMU)	A transitional team, often led by a development partner, that manages the initial stages of DAR implementation and establishes long-term governance structures within the country.
Smallholder farmers	Individuals managing small plots of land (typically <2 hectares) to produce crops or livestock.
Systems Analysis and Investment Design (SAID) framework	A structured tool used to map a country's digital agriculture ecosystem.
Use case	A "job to be done" or functional area in agriculture where digital tools can drive improvements.
Use case areas	Thematic groupings of use cases within digital agriculture, such as smart farming, financial services, advisory, supply chain management, and ag intelligence.
Vision statement	A forward-looking, strategic goal that describes the desired future state of digital agriculture in the country, typically developed during DAR creation.

Note: For additional digital agriculture terminology, please refer to the glossary section of the "State of the Digital Agriculture Sector" Report.

Summary steps of the DAR approach (I / II)

Approach	Steps	Analyses
1. Diagnostic assessment	**1A** Assess overall agriculture landscape	• Perform a rapid analysis of key elements of the agriculture landscape (e.g., sector contribution to GDP, employment, major subsectors, key stakeholders) • Identify key challenges impacting the sector (e.g., productivity gaps, risks, value chain inefficiencies)
	1B Map the digital agriculture ecosystem	• Assess existing visions and digital agriculture priorities and objectives of the country • Define key use case areas (e.g., advisory, smart farming, ag intelligence) • Map key solutions and initiatives across the digital stack and enabling environment • Identify major players (e.g., solution providers, funders)
	1C Determine maturity of the digital agriculture ecosystem	• Evaluate the maturity and readiness of the digital ag ecosystem across the use case areas, digital stack, and enabling environment (i.e., determine if each element is nascent vs. exists but needs strengthening or is not at scale vs. is strong and at scale)
	1D Assess implications to inform DAR development	• Based on diagnostic findings, identify key gaps and opportunities where digital agriculture can have an impact, in order to inform the next step of use case prioritization
2. Use case prioritization	**2A** Identify potential use cases	• Within each use case area defined in Step 1B (e.g., advisory, smart farming), identify long-list of potential use cases
	2B Prioritize use cases	• Select evaluation criteria to use to refine list of use cases. Consider criteria such as impact (e.g., farmer coverage, impact on cost/income), digital readiness, feasibility, or scalability. • Apply evaluation criteria to long list of use cases to create a prioritized list (e.g., rank use cases as low/medium/high priority)
	2C Validate and finalize priority use cases	• Validate high priority use cases with key stakeholders • Consider use cases that are priorities in the short-term versus long-term
3. Vision development	**3A** Define the vision for the DAR	• Create a vision statement that sets the overall DAR ambition over a particular time frame (e.g., 10 years) and is aligned with key priorities (e.g., national development objectives) • Iterate on the vision with key stakeholders
	3B Define specific goals that outline the target end state	• Define more specific goals for digital enablement across agricultural ecosystem
	3C Develop impact pathways	• Establish an impact framework that maps causal pathways between activities across priority use cases and target outcomes at the initiative-, use case-, and overall DAR vision-level

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Summary steps of the DAR approach (II / II)

Approach	Steps	Analyses
	4A Identify specific initiatives	• Identify specific initiatives across the digital stack and enabling environment essential to achieving each prioritized use case
4.Roadmap development	**4B** Develop DAR strategic framework	• Develop a DAR strategic framework to serve as an overall guiding structure. This should include the Vision (from Step 3), the prioritized use cases across each use case area of focus (from Step 2), and initiatives (from Step 4A).
	4C Define sequencing, timelines, and milestones	• Define the sequencing, timeline, milestones and deliverables for implementation of the initiatives • Consider near-term (e.g., 2–4 years) "quick win" initiatives aligned with political decision-making cycles, and longer-term (e.g., 5-10 years) initiatives that strengthen the broader ecosystem
	5A Develop initiative charters	• Create detailed initiative charters for each prioritized use case, describing initiatives to implement the use case directly and others across the digital stack and enabling environment • Map dependencies between prioritized use case and initiatives
	5B Develop business and investment cases	• Conduct an economic and financial analysis on use cases (with key initiatives) including cost estimation, potential revenue/savings, and return on investment (ROI) • Assess the expected impact, such as improvements in productivity, profitability, or efficiency, through the business case • Identify potential funding sources and partnerships to support investment
5.Implementation planning	**5C** Establish governance structures	• Define and establish roles and responsibilities for overseeing DAR implementation • Set up a Digital Agriculture Deliver Unit or Project Management Office body to drive and coordinate implementation • Create initiative charters that detail accountability and decision-making processes
	5D Design monitoring approach	• Develop key performance indicators (KPIs) to measure progress against metrics for the DAR vision and each use case area as defined in Step 3 • Create performance dashboards to visualize and report on progress • Design feedback loops to ensure continuous improvement based on performance data
	5E Periodically review the DAR	• Regularly review and update the DAR, in line with evolving priorities, lessons learned, and shifts in the digital and agricultural landscape

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Acknowledgements

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