HEIFER® INTERNATIONAL

GUIDEBOOK

Digital Solution Inclusion

in Smallholder Farmer Programming

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Introduction

Digital Technology for Farmer Impact

Welcome to the Digital Solution Guidebook!

In its 80-year history, Heifer International has leveraged different methodologies and tools as it has worked to empower smallholder farmers to achieve a sustainable living income in its goal to end hunger and poverty while caring for the earth. Heifer's programming has comprised four high-level thematic areas:

- Production advisory and climate-smart agriculture (CSA)
- Access to markets and traceability
- Access to finance and last-mile banking
- Social capital and community development

In the last few years, digital technology has increasingly become an additional instrument in Heifer's toolbox, augmenting long-term programmatic initiatives and sparking new, innovative partnerships. The two key reasons for incorporating digital technology into programming are:

- To enhance existing interventions by bringing the benefits of digitalization.
- To close the digital divide that prevents farmers from benefiting from services available ivn the broader digital economy.

Recognizing the value of digital solutions to elevate and scale development programming, Heifer established a digital technology specialty department, Heifer Labs, in 2019. A global unit connected to regional and country program teams, Heifer Labs supports local initiatives and priorities with:

a. original digital technology research and due diligence
b. partnerships with technology providers, and
c. digital domain expertise throughout the solution implementation journey.

Digital solutions deployed by Heifer program teams have followed the same high-level thematic areas mentioned above. Recent examples include:

Improved production, mechanization and women empowerment with Hello Tractor.

In Kenya, Uganda and Nigeria, Heifer has partnered with Hello Tractor, an agritech and tractor sharing company, to tackle a significant challenge impeding smallholder productivity: the low level of mechanization. Hello Tractor's mobile platform-based access to tractors and pay-as-you-go tractor financing has enabled farmers, especially women, to not only reliably access tractors and improve their production, but also become tractor owners and entrepreneurs themselves. Additionally, the technology partnership model has created new capacitation and youth engagement opportunities, such as building skills in tractor maintenance.

Digital value from paper records with Artificial Intelligence (AI).

In Nepal, Heifer has collaborated with FruitPunch AI, a leader in the AI for Good community, to address a core component of the digital divide for farmers: their inability to benefit from their own data. In Heifer's model of supporting farmers to organize in cooperatives, these cooperatives generate and store a great amount of data as they provide services to their members. However, the data remains inaccessible to the digital economy, because it is kept in paper records. Heifer and FruitPunch AI are using computer-vision AI software to quickly digitize and structure farmer and cooperative historic data, such as loan agreements, which can then be used to facilitate bank loans at a lower interest rate.

Defensible cost of production data and fair value distribution in coffee.

With partner, Fairfood International, a Dutch NGO dedicated to ensuring that global supply chains are fair and sustainable, Heifer has published the "Commodity Living Income Strategy" White Paper, a data-forward strategy for commodity supply chains. The paper outlines a process for supporting farmer livelihoods through holistic efficiency and income interventions, and provides an open-source methodology for calculating commodity prices that deliver living incomes for farming households.

The Need for a Structured Approach

While Heifer has performed successful digital technology deployments within programming in multiple countries and regions, some challenges and inefficiencies throughout the digital solution implementation journey have also emerged. We define that journey as the complete process from solution ideation through scaling, with additional details in the Digital Solution Implementation Journey section.

The main challenges and inefficiencies we have observed include:

Incomplete vendor landscape evaluation. Digital platform projects have been launched after identifying a single potential software vendor, perhaps one with which the program team already has a relationship. This approach could be the result of not proceeding with the extra step of evaluating multiple vendors, or of not having the right tools to objectively compare vendor capabilities.

Not fully meeting the needs of users. Like other projects in development, sometimes digital interventions have been conducted without fully engaging the solution's users (farmers and cooperatives) throughout the process, using a top-down approach. This practice is sometimes related to starting with a software partner's available applications and trying to fit them to the project's needs, instead of starting with the user requirements.

One-time projects without sustainability. We have noticed multiple examples of digital platforms that were designed and deployed as part of a specific program, often within a corresponding timeline and budget, but did not scale long-term. A key missing component here has been a plan for long-term viability of the digital platform as a locally sustainable business, allowing it to prosper after the initial grant or program period.

Insufficient sharing of best practices across countries. While Heifer teams use multiple internal fora to share project updates, including digital components, we have noticed a general lack of awareness and best practice sharing across countries. This siloed approach inhibits solution design and deployment optimization.

To address these inefficiencies, Heifer has endeavored to create an end-to-end guidebook for digital solution inclusion in smallholder farmer programming, offering both strategic ideas and detailed workflows for every stage of the journey. The Guidebook relies on several key digital technology principles:

- User-centric design (UCD) approach to fully determine and represent needs of users, who are farmers and cooperatives.
- Meaningful and iterative user involvement and feedback throughout the process.
- Best agile software design, development and testing practices.
- Farmer and cooperative data governance, ownership and fully informed consent.
- Post-program solution sustainability via local commercial partnerships.
- Low-infrastructure and low-digital literacy compatibility.
- Interoperability and programmatic integration among different platforms.
- Hands-on training.

For clarity, the focus of the Guidebook will be digital solutions that are part of programming and directly interact with farmers and/or cooperatives; and not digital technology used to run an organization's operations. We will use "digital solution," "digital application or app" and "digital platform" interchangeably in the document. Additionally, smallholder farmer organizations are known as "cooperatives," "agricultural cooperatives" and "farmer producer organizations (FPOs)" based on country context. For simplicity, we will use those terms interchangeably in the Guidebook.

Goals

After initially creating the Guidebook as an internal reference, Heifer has released this external version with the following goals:

1. Improve overall digital solution quality, applicability and sustainability as part of smallholder farmer development interventions.
2. Encourage a positive, collaborative and inclusive discussion of strategies, best practices, tooling and successful examples of digital platforms providing additional economic and social capital opportunities for smallholders. Please see the Feedback section to engage with us.
3. Stimulate sustainable digital solution partnerships among users, non-profits, software providers and market actors.

Objectives

The Guidebook aims to meet the following specific objectives:

1. **Consolidate and share expertise and examples** developed by different country and program teams.
2. **Describe a structured approach** to designing, delivering, measuring, and scaling digital components of programming.
3. **Provide answers and solution**s to common questions that arise at different stages of deploying digital technology.
4. **Identify and share guidance** on using specific methods and tools at each solution stage.

Audience

After initially creating the Guidebook as an internal reference, Heifer has released this external version with the following goals:

- **Non-profit and academic development program staff** can leverage the Guidebook as a **step-by-step guide** to planning for, designing, deploying, measuring and scaling digital solutions.
- **Country and Program Directors** can identify **best practices and a structured approach** as they consider how to best use digital technology to meet their programmatic goals.
- **Senior leadership** in non-profits and commercial partners can use the Guidebook as an **at-a-glance reference** for existing processes and deployment examples as they engage smallholder farmers with digital technology.

Format

The Guidebook follows Heifer's current view of the complete digital solution implementation journey from project initiation to scaling. At each journey stage, we describe the context and identify the goals, objectives, challenges, and sequential activities for the stage. We also provide suggestions on the types of templates and tools that support that stage and their content.

How Best to Use This Guidebook

Designed as a detailed resource, the Guidebook is a large document. No one is expected to read all of it at one time. Two key questions can help determine how the Guidebook can provide the most value:

1. What is your role in implementing digital solutions for smallholder farmers?
2. Where along the digital solution implementation journey is your team?

Use the Guidebook Sequentially

If you are at the start or early in your digital component implementation, or if you are planning the next release of a deployed digital solution, use the Guidebook sequentially from the beginning. You will likely find some new ideas or methods to add to your approach.

Jump to an Implementation Stage

If you are in the process of implementing a digital solution and would like additional resources for the current or future stages, jump to a specific implementation stage using the Table of Contents.

Example: If you have already performed an assessment of the overall need and could use additional methods to fully design the digital component, you would jump to the Solution Design stage.

Get Quick Help

If you have a specific question or task in mind, use the table below to guide you to the right stage.

Example tasks and questions include: "I would like to establish a digital readiness baseline," or, "What should a test plan for a digital solution include?"

Example Tasks and Questions, by Stage

DIGITAL SOLUTION STAGE	TASK OR QUESTION
Project Initiation	• How can I identify potential digital technology partners for my project? • I would like to digitize an existing part of my project or process. • I would like some help with the digital technology component of a grant proposal or concept note.
Assessment	• I would like to establish a digital readiness baseline. • How can I establish a data-driven foundation to design or prioritize my digital intervention?
Solution Design	• How do I make sure the digital solution will meet farmers' or cooperatives' needs? • How do I identify all potential users and components of my platform? • How can my digital platform integrate with ecosystem or value chain stakeholder systems? • What are some user experience (UX) best practices for farmer digital solutions?
Software Vendor Selection	• How can I objectively compare software vendor or partner capacity to deliver a digital solution? • What should a Request for Proposal (RFP), Request for Announcement (RFA)and Terms of Reference (ToR) for a digital platform include? • What are some required capacbilities of a digital technology vendor? • What are some best practices when looking for a potential software vendor? • What are different financial models for engaging a digital solution vendor?
Software Development	• What should a digital solution vendor agreement include? • What are the required components of a digital platform budget? • I would like to ensure that the final digital solution reflects the initial design and my users' needs. • What should a development plan for a digital platform incorporate? • What should a test plan for a digital solution include?
Ecosysten Activation	• How can I bring local ecosystem partners onto my platform?
Pilot Deployment	• What are some potential challenges with digital platform deployment? • What is a reasonable timeline for digital solution deployment? • How can I maintain agility in my deployment process?
Metrics and Impact	• What metrics should a digital application be collecting? • I would like to demonstrate the specific impact from my digital solution. • What should digital-specific surveys or reports include? • How can I measure secondary impact from a digital intervention, such as increased digital literacy or device ownership?
Scaling	• What should a digital project retrospective incorporate? • What are some considerations for scaling an existing digital platform?

Digital Solution Implementation Journey

What is the nature of your digital technology for smallholder farmers project?

Perhaps you are looking to deploy a digital platform that will improve goat and vegetable farmers' production by providing quick answers to their questions and increase their income by connecting them with more buyers. Or you are seeking to deploy a coffee traceability system for all value chain actors that will guarantee origin and quality under a government-approved seal for premium pricing. Or perhaps you have won a major grant with a significant digital component, and you want to ensure a successful rollout that meets donor requirements.

All the above scenarios share objectives and questions. Above all, you want to ensure that farmers' interests are included early and represented fully in the project. You are looking for an easy-to-use digital solution that precisely meets farmers' or cooperatives' needs and is fully tested before engaging any of their time. And you are seeking a software vendor or partner who has the capability to help deploy, support and scale the intervention.

What is the first step? What does a comprehensive digital solution deployment process look like? How can you ensure that your solution design fully takes all stakeholders' input into account? How can you objectively compare multiple vendors' capabilities to assist in the project? What components should supporting templates or tools include? What digital technology-specific metrics should you be collecting to add to your project's Monitoring, Evaluation, Research and Learnings (MERLs)?

To help meet such objectives and answer these questions and others, we have synthesized Heifer's existing experience to define a comprehensive Digital Solution Implementation Journey. We hope that in each stage below, the goals, objectives, challenges and activities will add to your existing capacity and practices.

Journey stages and their approximate timelines

Stage 1: Project Initiation
~1 to 2 months

Stage 2: Assessment
~3 to 4 months

Stage 3: Solution Design
~3 to 4 months

Stage 4: Software Vendor Selection
~2 to 3 months

Stage 5: Software Development
~3 to 6 months

Stage 6: Ecosystem Activation
~1 to 2 months

Stage 7: Pilot Deployment
~2 to 3 months

Stage 8: Metrics and Impact
~2 to 3 months

Stage 9: Scaling
~2 to 5 years

Stage 1: Project Initiation

Approximate Timeline: 1 to 2 months

Non-profits and their partners have a wealth of expertise in initiating a project: it is a core capacity. Let us examine initiating a digital project. For example, you are looking to digitize a previously manual process, such as keeping dairy production records. Or you are submitting a grant proposal or concept note with a significant digital element. What are the additional considerations and aspects?

Goal	**Define a digital solution that:** • Aligns with program priorities • Has clearning results and impact for farmers • Engages the right stakeholders and/or partners
Objectives	• Create a high-level solution definition, including user personas, proposed value and impact hypothesis(-es). • Identify the team. • Define a high-level budget. • Identify digital-specific metrics. • Identify potential partners. • Create a high-level implementation timeline.
Challenges	• Lack of specific country focal point for whom project is officially a significant part of their duties. • Lack of in-country bandwidth. • Inability to identify appropriate partners – locally or regionally. • Difficulty to determine and align with program priorities. • Obtaining specific information required for budgeting.

1.1. Create a High-Level Solution Definition

Problem Statements	What is a specific problem that digital technology can solve as part your overall program or project? While it is helpful in this section to describe and locally quantify the broader context of the digital divide farmers face – such as insufficient access to digital tools or inability to participate in the formal financial system – you should then focus on a narrowly defined challenge a digital platform can address.

Example Problem Statements

- Farmers are unable to easily receive local and national price information for their production in order to improve their bargaining power.
- The current loan application and disbursement process for farmers is manual, paper-based and cash-only.
- Producers and other value-chain actors lack a traceability system that can transparently guarantee the origin and processing of their product to earn a higher price.

Farmer Need	Which one or more of the following need categories apply to the solution? These will help identify potential partners, existing solutions and software vendors.

Example Categories

- Production advisory and climate-smart agriculture (CSA).
- Access to markets and traceability.
- Access to finance and last-mile banking.

User Personas	User personas are fabricated descriptions of the types of people or groups that you think would interact with the solution, and are ideally based on background research or experiences that help you understand their unique needs and preferences. Considerations here should start with those who will directly interact with the solution, such as farmers, cooperative staff, or agrovets or community agrovet entrepreneurs (CAVEs). Next, consider other value-chain actors, such as input sellers, buyers or processors, and what their role in interacting with the system might be. Lastly, reflect on ecosystem participants, such as financial institutions or local government, that might be providing information into the platform or receiving data from the platform into their own systems.

Impact Hypothesis(es)	Impact hypotheses are typically an "if, then" statement that outlines the key drivers and changes expected from the solution intervention. It answers the question: What do we believe about the users' needs and expected outcomes thanks to our intervention?

Example Hypotheses:

- If farmers had easy access to CAVEs on nights and weekends, then they would incur fewer losses from animal accidents or disease.
- If farmers had easy access to more input sellers, then they would be able to save on inputs, increasing profits.
- If farmers could receive cashless loan disbursement via mobile money, then they would be able to invest in their business faster and benefit from the digital economy; e.g., buy inputs online.

Proposed Value	What is the specific value the digital system will deliver to users while addressing the problem statements?

Example Proposed Values

- Improve bargaining power by providing historic and real-time local and national pricing information.
- Ensure timely access to loans by automating loan data collection and processing and facilitating cashless disbursement.
- Promote higher pricing via a controlled-access traceability system that guarantees immutable records.

Solution Components	You will create a detailed solution architecture in the Solution Design stage. For now, let us define the high-level solution components. This basic list of components and functions will help you describe the project to the larger team, identify potential partners and work out an initial budget.

Example Guiding Questions

- **How will farmers and other users interact with the platform and receive the value we identified above?**
  For farmers, the most common component is a mobile application (app). However, they could alternatively be receiving Simple Messaging Service (SMS) (text) notifications, which means a backend service that creates the messages and interacts with local telecommunication companies to send them.
- **What is the role of cooperative staff in using the system?**
  They might interact with it via a web interface on a laptop at the cooperative; for example, in the case of a loan management system.
- **Does the platform require field data collection, and how are you going to accomplish that?**
  One example is Internet of Things (IoT) devices, such as sensors.
- **Are you planning on processing data and generating insights?**
  Connecting with buyers, input sellers or financial institutions? You will need backend services that might include databases and Machine Learning (ML) or Artificial Intelligence models.

1.2. Identify the Team

In addition to existing project roles and responsibilities, it is useful in a digital project to think of the following team member categories:

Core	Members who are committed to the project and responsible for driving activities. They are working on the project daily or weekly as part of their official responsibilities.

Examples Include

a. **Country program or project local digital lead.** This is a key role for the project. It requires a combination of programmatic and digital technology experience. This person will ensure that the project aligns with country or program resources and priorities.

b. **A digital technology lead,** who would add value especially in the following scenarios:
   - similar types of projects are being deployed across multiple countries.
   - stakeholders range from local to regional to global
   - where data are being shared with regional and/or global stakeholders
   - where there is a very high level of technical difficulty involved

c. **Other local, regional or global resources with specialized skills,** such as business development, partnerships or impact investing.

Contributors	Members who complete specialized activities or participate in discussions.

Examples Include

a. **Specialized local talent,** including country leadership, program leads, or other value chain experts.

b. **A digital technology specialist,** who would add value especially in the following scenarios:
   - where there is need for a confined and specific technical task, such as completion of a due diligence process or interoperability assessment.
   - where solutions could be replicated or have potential for scale in other regions/countries.

c. MERLs team.

d. **Other local, regional or global resources with specialized skills,** such as business development, partnerships or impact investing.

Advisors	Members who are kept informed and maintain alignment with country, regional and organizational goals.

Examples Include

a. Program Directors

b. Country Directors

c. Regional and global leadership

1.3. Define a High-Level Budget

When planning a digital implementation, consider adding these items to you standard budgeting process:

ROOT CAUSE OR DIGITAL READINESS ASSSESSMENT

Depending on previous local research, it may be necessary to conduct an assessment to investigate the root causes and full dimensions of the problem(s) you are attempting to address. For example, imagine that data exist already indicating that 70-80% of farmers in an intervention area have already taken out bad loans. The base data do not necessarily explain why farmers have been forced to do so, or what other factors contribute to their insufficient access to funding. Additionally, if there are no existing data on device ownership, digital literacy, or access to digital tools, you should also consider budgeting for additional data collection specific to these themes.

DATA COLLECTION

Your solution may require additional data elements that sit outside of the above assessments. For example, if your program has a crop insurance component, then you may want to budget for farm polygon data collection. Similarly, if your program is focused on agricultural advisory and extension services, then you may want to budget for soil sample collection and analysis. Consider the following: what are the data required to make the solution work and/or demonstrate immediate value to my users?

USER EXPERIENCE (UX) RESEARCH AND USER INTERFACE (UI) MOCKUPS

User experience (UX) refers to how a person feels along the entire journey of interacting with the digital solution. This includes experiences outside of actually using the product like how they became aware of the product and how they can refer others or submit feedback. User interface (UI) is the visual layout of a digital solution. Depending on the previous experience and in-house capacity of the software vendor(s) that will deliver the digital platform, it may be necessary to support additional UX/UI design processes with local participants and Heifer staff. A few options include:

a. **Hire a specialized consultant**
   This person or company's role would be to interpret available information on farmer's preferences for using digital tools (or "preferred UX") and create visual mockups that guide the look (or "UI") of the digital solution.

b. **Conduct an in-field UX/UI workshop.**
   Consider also the need and associated costs to visit farmers and ask them about their priorities and preferences, if those data do not exist. This could also be a good opportunity to get initial feedback on UI mockups, as available, which would guide solution design before costly development resources are activated.

SOFTWARE DEVELOPMENT AND TEST

While your organization may or may not manage software development directly, it is still helpful to have an idea of what costing to expect from a vendor for development hours. While the complexity (or "size") of the software development will differ significantly based on needs, one cannot underestimate the number of resources required to create (or usually update or customize) an intuitive and well-functioning digital solution. The key cost factors here will be the number of software development or coding resources and their hourly rate. Typically, you should plan on no fewer than 5 software developers, and especially a dedicated project manager (sometimes also called a "product owner or PO") to ensure delivery. Additionally, you should also specifically plan for quality assurance (QA) and testing costs, which are sometimes performed by the software development team or a specialized QA team. QA is important because it ensures that the solution works correctly and without bugs, leading to fewer problems after release and higher user satisfaction.

OPERATIONAL ENVIRONMENT

While they are being developed and especially once deployed, all software solutions require a computing (also called "hosting") environment in which to operate. Almost always, that is a cloud environment from a major provider, such as Amazon Web Services (AWS). This typically makes up a significant monthly cost. While your organization is unlikely to pay this cost directly, it is good to know that it is a key driver behind a software vendor's quote. In special cases where Heifer is responsible for developing and maintaining a software product, then the costs of the operational environment should be fully scoped and accounted for. Keep in mind that during the development of a product, two environments are maintained simultaneously, a "test" environment where bugs are resolved and a "production" environment where the final version of the software is used by real users. This means that you can expect for these operational environment costs to reduce over time as the product transitions from a development phase to a "shipped" or deployed phase.

SUPPORT

The three major reasons why a digital platform fails are that it does not provide value; it is difficult to use; and users can't access support when they have a question or problem. It is vital to ensure the software vendor has sufficient support resources, in-country, speaking the local language; and you should account for them in the budget.

MARKETING AND ECOSYSTEM ACTIVATION

Most digital platforms interact with other value chain or ecosystem actors in addition to its core users (farmers, agrovets, cooperatives). Examples include input sellers and financial institutions. You should consider the cost of outreach and training efforts to bring those stakeholders onto the platform, make the business and technology case to them, and provide training, for the platform to be successful.

1.4. Identify Digital-Specific Metrics

Most non-profits have a very thorough and well-established Monitoring, Evaluation, Research and Learnings (MERLs or MELs) and Collaboration, Learning and Adaptation (CLA) process, with skilled resources globally, regionally and in-country. What are some additional digital-specific metrics that can tell you if the digital solution is succeeding and how much it is contributing to the organization's overall goals? While we'll provide more comprehensive examples in the Solution Design stage, it is often helpful to have an initial list at this stage, whether it is to communicate the proposed impact to stakeholders or complete the corresponding section on a concept note.

Here is a high-level list from an example concept note:

- Net Promoter Score (NPS) of the platform
- % increase in digital device ownership (by age and gender)
- % increase of users who use digital tools in their work (by age and gender)
- % increase of users who feel comfortable using digital tools (by age and gender)
- Number of transactions on the platform (by type and gender)
- Number of loans facilitated by the platform (by ticket size and gender)
- Seasonal user retention rate (by age and gender)
- Qualitative data on challenges with using the software and suggestions for new features and improvements

1.5. Identify Potential Partners

Here we draw a distinction between potential partner organizations, which might participate in the project with experts, tools or co-financing (perhaps engaging in a joint project), and software vendors, whom your organization and/or other project partners would typically contract with to develop and help deliver the digital solution. We will discuss the former in this sub-section while devoting a whole section to selecting the latter.

In addition to existing processes your global, regional and country business development and partnership teams have developed, here are some criteria when determining potential digital partners.

Digital Capacity and Tools	What digital tools might already exist that meet some of your project's needs, and which ones are created and owned by other non-governmental organizations (NGOs) or research institutions? This would indicate that an organization likely has software development, user need assessment and digital technology deployment capabilities.
Value Chain and Country Presence	Pertinent to all partnerships, this category applies to digital ones, as well. Which other organizations are already active in cacao in that country, for instance? Are digital solutions part of their efforts?

1.6. Create a High-Level Implementation Timeline

At this point, we are not looking for a detailed project plan for the subsequent implementation stages. We are looking to communicate to the broader team and any potential partners or donors the overall scope, high-level milestones and approximate duration of the digital deployment.

Example Implementation Timeline from Concept Note

STAGE	ACTIVITIES	EST. TIME	MILESTONE
Digital Project Activation and Assessment	• Identify required technical skills and available capacities. • Develop overall delivery plan. • Establish digital divide baseline.	1 to 2 months	Project activated; baseline research completed
Solution Design	• Create high-level design (HLD), user stories and detailed requirements • Solicit and incorporate feedback from all stakeholders via user-centric design (UCD) • Identify and meet specific staffing needs	2 to 3 months	Project actived; baseline research completed
Software Development or Customization	• Develop software development and deployment plan • Develop and test prototypes • Iterate based on direct user feedback	3 to 4 months	Solution development complete
Ecosystem Activation, Deployment and Training	• Establish synergistic connections with ecosystem actors, such as local government, agronomists and financial institutions. • Iterate on deployment plan based on stakeholder feedback. • Schedule and conduct training workshops at cooperatives. • Perform solution adoption and value check-ins at regular intervals.	3 to 4 months	Solution deployed; training completed
Metrics, Impact and Scaling	• Solution in use by farmers and agrovets. • Collect and analyze in-app metrics. • Conduct user experience and impact surveys. • Synthesize learnings and identify appropriate scaling areas and targets. • Develop further digital solution enhancement and training plans.	9 to 15 months	Solution deployed; training completed

Stage 2: Assessment

Approximate Timeline: 3 to 4 months

Two factors that significantly affect digital solution success are: addressing the root causes of the problem, in the correct order, and having a realistic picture of the digital readiness of the farmers and cooperatives who will use the solution. Designing the digital platform to tackle the root causes will ensure optimal use of resources. Knowing the level of digital readiness will guide the user experience, ecosystem activation and deployment plan.

Employing a data-driven approach to address the 2 factors above means first researching current data availability. In many cases, your organization and partners will have local data on the dimensions and root causes of the problem; while data on digital readiness might be available from external sources, such as government agencies. Data specificity and localization are important: for example, having information only on the country-wide smartphone ownership does not paint the correct local picture by gender. Or, knowing the local levels of smartphone adoption, but not the users' ability and willingness to use digital tools might lead to an inadequate amount of training when deploying the solution.

If sufficient information on root causes and/or digital readiness is not available, we recommend conducting an assessment to create solid data foundation for the project. This section will describe collecting both types of data.

Goal	Ensure the digital intervention will address the root cause(s) of the problem while accounting for the current state on the ground.
Objectives	• Determine dimensions and/or root cause(s) of problem. • Determine digital readiness.
Challenges	• Lack of root cause or digital readiness data. • Research consultant identification and evaluation. • Survey administration logistics.

2.1. Define Research Questions

Let us say that you are planning on delivering a digital platform that will address the following four functional areas within improving farmer and cooperative access to finance:

- Formal loan application and processing (from banks or microfinancing institutions (MFIs))
- Cashless disbursement and payments
- Business plan creation for cooperatives and farmers
- Informal loan management systems for cooperatives

You already have a substantial amount of data on the dimensions of the problem. For example, you already know what percent of farmers have existing loans, the ticket size and interest rate; what percent of cooperatives employ loan management systems; and what perfent of farmers and cooperatives have business plans to facilitate applying for financing. What are the research questions that will help you uncover the root causes of those problem dimensions and illustrate users' needs and gaps that will serve as input for the solution design later? Examples include:

- Why are many farmers forced to take out bad loans?
- What are the obstacles preventing more farmers and cooperatives from having business plans?
- What are the factors keeping farmers from being able to use existing loan products from banks?
- Why are more cooperatives not adopting loan management systems for their own lending?
- What are the challenges cooperatives that already use digital solutions face?

Consider also assessing the user group's readiness to adopt digital technologies. This can be assessed across multiple factors, including literacy levels, perception of risk in adopting new technologies, and current adoption rates and types of digital tools.

2.2. Select Research Consultant

As with most surveys and research projects, you are looking for a local company that can speak to respondents in the local language and is aware of cultural norms. Additionally for digital surveys, it is important to consider the significance of observation and demonstration. The best way to measure how well farmers or cooperative staff use existing digital tools may be to observe them in the process of using a digital platform, or to ask them to demonstrate their use and ask context-specific follow-up questions.

Another consideration when selecting a research consultant is the nature and quality of the deliverables.
In addition to recording raw data, to what extent is the company or individual able to analyze the data, deliver insights and create a report? The consultant should be able to provide sample deliverables for evaluation.

Key sections in a description of services that would serve as the core for a Request for Proposal (RFP) or Terms of Reference (ToR) for a digital research consultant include:

- Context
- Benefits for smallholders and/or cooperatives
- Problem
- Proposed solutioncomponents
- Approach
- List of services
- Deliverables

2.3. Create Survey

Preferably, creating the survey itself would be a collaborative and iterative process among the country or program team, the research consultant and any partner organizations. The process would start with an initial context and brainstorming meeting, covering the objectives and sections of the survey. Following that, you would expect the consultant to create an initial draft, which would then go through a series of reviews by all parties.

2.4. Conduct Survey

The typical timeframe for data collection is 1-2 months. Naturally, factors that affect the timeline are the number of respondents and, especially, their connectivity. As we know, farmers might not always have regular mobile connectivity, and you might need to schedule times for them to come to the cooperative to take a phone survey. At the same time, you need to be aware of issues of data contamination (respondents' being influenced by others' answers) and data privacy in a group setting. The research consultant should drive the plan to conduct the survey, surface any potential issues and work with your organization and local partners to resolve them.

2.5. Analyze Data and Produce Report

The timeframe for the consultant to analyze the data and produce a report should be no more than 1 month. You should also expect for the consultant to also provide you with the raw, anonymized data. The report should contain actionable insights based on the research questions established at the start.

Stage 3: Solution Design

Approximate Timeline: 3 to 4 months

In many projects, the actual users of the solution – such as farmers or cooperative staff – are consulted only once the solution is well-defined. We advocate for a different approach. You are looking for a structured approach that recognizes and incorporates the experience and needs of users and the input of country, program and field team from the start. That approach is user-centric design (UCD). UCD is used by software companies of all sizes to save time and resources by ensuring that the solution design is based on requirements described by users and other stakeholders directly. This section will describe the UCD process and suggest supporting tools for at each step.

Goal	Create a comprehensive solution design that addresses the correct aspect of the problem, meets the needs of users and enables your organization to select the most suitable vendor to deliver the solution
Objectives	• Fully understand the problem(s) and user needs. • Create a high-level design (HLD) for the digital platform. • Define functional and non-functional platform requirements to select a solution provider (software vendor). • Fully solicit and incorporate all stakeholders' feedback.
Challenges	• Collecting detailed input about current process, needs and gaps. • Insufficient local team bandwidth. • Not budgeting for design activities during budget cycles.

3.1. Review and Update Initial Project Design

In the Project Initiation stage, you defined specific problem statements that could be addressed with digital technology, the user personas that would benefit and other key information that would later drive the project implementation.

Here are some reasons why your initial problem statements and user personas may need to be updated:

- A significant amount of time may have elapsed since those initial definitions, personas and other key information were drafted, especially if they were part of a grant application or concept note.
- Formal problem definitions or personas were never created.
- User, overall program or specific project needs or context have changed. Some user interaction was involved, but maybe not as much as the team would have liked.

To verify problem statements and user personas, you should conduct a 1-2-hour interactive discussion (in person or virtually) to update or fill in additional context.

Key topics for the discussion would include:

- Country-, project-, area- or province- and value chain-specific context.
- Review of the initial problem statement(s).
- Review of the initial user personas.
- High-level outline of the current process you are attempting to digitize or optimize with digital technology.
- High-level gaps in that process.
- Desired outcomes from the digital solution.
- Review of the project team and roles.
- Cadence and next steps.

Typical participants of this discovery session would include:

- Your stakeholder team that is raising the need for a digital solution and offering the initial problem statement(s). Normally, this would be a specific program, project or field team; but it could certainly be a country or regional team. A good idea is to reference the team identified in Stage 1.
- People with specific domain expertise, such as digital technology, business development, partnerships or impact investing.
- Where possible, user representative(s). This could be friendly partners, farmers, or other community representatives that you trust engaging early on to co-create the solution.

Now that you have updated your initial project design, the next activities will focus on unpacking your personas and solution components, setting the stage for Software Vendor Selection. This next section not only ensures that you are hiring the right partner for the right job, but also supports software vendors in more accurately scoping out costs and timelines for implementation.

3.2. Document Current State

Designing a new digital solution or a new version of one, entails creating a future state – a set of capabilities, specific features, interfaces and process – that addresses the problems users are experiencing and provides value to them in an intuitive manner. To generate a future state that meets those goals, you must fully understand and document the current state that users are experiencing.

The current state is also known as the as-is user journey and its components are:

- The users themselves.
- The existing process within the problem area.
- How users interact with other parties within that process.
- What users' needs and gaps are.
- What other digital technology is already in use.

Users	In the Project Initiation stage, we already considered who the user personas in the solution will be. In case that sub-task was not completed, significant time has elapsed or conditions on the ground have changed significantly, you should re-examine the user list. With a focus on smallholders, most digital platforms would be geared towards farmers. What would be the role of the cooperative as a business, informational and digital hub? What other value chain, market actors or government actors do farmers and cooperative staff interact with within the area of interest? Which ones of those stakeholders would interact with the platform directly, versus providing information to or receiving data from it? Does your organization or local partners need to interact with the technology and how?
Process	What are the chronological steps or milestones in the process we are trying to digitize or optimize? And how do users interact at each step?

Example: Within the practice of farmers' accessing financing, we might have the following states and interactions:

- **Business plan creation:** farmers, cooperative staff, your organization or local partners collaborating to collect farm and personal business and financial data in a format acceptable to local lenders or the cooperative itself.
- **Data collection:** if there is no business plan in place, cooperative staff, a bank or MFI agent, your organization or a local partner might work with the farmer to collect the required information. Keep in mind to record how the interactions are happening: for example, data collection could be in person or over the phone, and information could be recorded on paper or in a spreadsheet.
- **Data verification and submission:** the party (-ies) collecting the information would likely have to check it for accuracy or otherwise process it, before submitting it to the lender.
- **Decision and notification:** the lender decides (using a manual process or their core banking system) and notifies the farmer, potentially through another party.
- **Disbursement:** the lender disburses the money to the farmer.
- Tracking and payments: the lender manages the loan and periodically notifies the borrower of relevant information, such as payment amounts, dates and remaining balance. The borrower submits payments until the loan is repaid.

The current process can be recorded in the form of a flow chart

Current Gaps	A vital component of the as-is journey is understanding the users' present gaps. They directly support the ideation to create the future state. As you document the current process, focus on what users would like to do that they are currently not able to do, and how available actions can be optimized. Look for inefficiencies.

Examples of needs and gaps by user within access to finance include:

a. Farmer:

- Loan and business data are collected manually from farmers by traveling to location.
- There are too many loan application data points to collect online, using data access.
- Credit history exists only for people who've taken loans from banks, not from coops or MFIs.
- Current Bank / MFI loan products are not farmer-friendly.
- Farmers cannot easily check loan balances.
- Farmers do not know what bank loans are available to them.
- Farmers lack a business plan.

b. Cooperative staff:

- Collected loan application data are checked manually before being ingested into coop loan approval system.
- Coop loan management platform is not user-friendly.

c. Bank / MFI:

- Loan application data are received manually (via spreadsheet), which slows down the approval process.

Existing Digital Technology	When deploying digital solutions to serve farmers and cooperatives, we aim to build upon or customize existing platforms, and not create new ones from scratch. We seek to identify solutions with an independently sustainable business model that can persist and continue to deliver value to users after a program or project has concluded. In the Software Vendor Selection stage, you will perform a vendor landscape analysis for all suitable options; while in this section, you will start by identifying solutions already used by your stakeholders.

To judge the overall applicability of digital technology already in place, you can leverage questions like:

- What are the platforms' capabilities and which parts of the overall process do they cover?
- What is their overall market penetration and their adoption by your users?
- What are their user metrics?
- What is their business model?
- Are they NGO-developed and owned, or delivered by commercial software vendors?

3.3. Create a High-Level Solution Design (HLD)

A high-level solution design (HLD) is a combined "report" from a user-centric digital solution design process. It is a technical document for a generally non-technical audience. It provides a quick view of a solution's architecture: its description, major components and functions, as well as how users interact with the solution to receive value. It is the guiding document for further low-level (detailed) technical discussions, decisions and design. The HLD has two distinct audiences, for whom it serves different purposes:

1. **For the project team and other organizational stakeholders, such as leadership**, the HLD shows:
   a. A quick solution overview (which can be used in concept notes).
   b. A high-level solution diagram, which details:
      - Solution components and their connections
      - How users interact with the solution.
      - How solution connects to external platforms.
2. **For software vendors with whom you will partner to deliver the digital platform,** the HLD:
   a. Is a key tool for vendor evaluations.
   b. Provides a single source of truth for all future partners.
   c. Presents a consumable architecture for low-level design the partner would complete.
   d. Includes the functional and non-functional requirements vendors must meet.

In the next section, we will example how to generate the individual components of a HLD with a user-centered approach, including functional and non-functional requirements.

3.4. Create User Stories

User stories are a namesake component of user-centric design. They are a brief description of who the user is, what they want to do, and why they want to do it. In other words, they personalize and focus the resolution of recognized needs and gaps in the form of performing an action to realize a benefit. The format is: "As a [user], I want to [action], so that [benefit]."

Consider the following two gaps observed during an as-is journey design session: Farmers do not know what bank loans are available to them, and Loan application data are received manually slowing down approval processes by banks and MFIs. Keep in mind that a single documented gap may result in multiple user stories, because the same lack of functionality or inefficiency might affect multiple actors. Example user stories include:

- **As a farmer,** I want to quickly and easily apply for a loan, so that I can buy inputs in time to have a good season.
- **As a cooperative staff member,** I want to get and share information about available government grants with farmers, so that they would have additional financing available.
- **As a bank or MFI,** I want to automatically receive verified loan application data into my loan processing system, so that I can approve applications within than 24 hours.

3.5. Create Solution Features or Epics

Solution features, or "epics" in code development, are the major functionalities required to solve a user's gap. Each user story will prompt one or more solution features, which describe high-level capabilities that operationalize the action the user wishes to perform. For example, if we take the first example above, "As a farmer, I want to quickly and easily apply for a loan, so that I can buy inputs in time to have a good season," it might trigger the following solution features:

- Easy-to-use application (app) where farmers can submit loan applications.
- Notification to farmers when loan has been approved.
- Easy to use interface where farmers can check loan balances and make payments.

Functional (FRs) and non-functional requirements (NFRs). FRs provide detailed context to solution features, breaking each one into building blocks and answering the question of how features will be implemented. FRs are required for the system to function, meet its overall goals and provide value to users. Meanwhile, NFRs are more general and ensure the system will function well and be successful.

Let us take the first solution feature above, "Easy-to-use application (app) where farmers can submit loan applications," and define some FRs:

- SMS or in-app notifications to the farmer with best available loans in their area, based on farm geolocation.
- Mobile UI where the farmer can enter information to create a business plan.
- SMS or mobile app user interface (UI) where the farmer can enter loan application information or upload a business plan.
- Integration with cooperative or financial institution loan management system to submit farmer loan application data.

Meanwhile, examples of NFRs would include:

- Simple user interface.
- Local language support.
- Local date and measurement format.
- Easy way to onboard farmers (e.g., must accept Excel/CSV).
- Minimal additional requirements on farmers.

To recap, the current as-is user journey describes who the users are and what the gaps are in current processes. These gaps help identify user stories that influence the overall design of the solution from the perspective of the user. User stories then drive one or more solution features, or "epics" in code development. Each feature then drives multiple FRs, or "stories" in code development. NFRs may drive specific "stories" in code development (e.g., "Implement local date and measurement format"), or they can guide the overall programming implementation (e.g., "Simple user interface").

Together, FRs and NFRs are a key deliverable from the design process and serve several important functions in the Software Vendor Selection and Software Development stages:

- They provide an objective and comprehensive checklist to start evaluating software vendors.
- They should be included as a technical addendum in the software vendor agreement to ensure that all parties have understood and accepted the expectations for the digital platform.
- They inform the development, testing, deployment and training plans for the digital solution.
- They should be used as a checklist to track progress and full execution of the software vendor agreement as the project progresses.

3.6. Gather Complete Feedback

From a team perspective, the design process outlined so far is performed by the core team and contributors while keeping advisors updated. The deliverables created so far should be considered draft versions until you have reviewed them with all appropriate stakeholders and incorporated their feedback. Who are all the key stakeholders?

- Cooperative or farmer-producer organization (FPO) staff members (who are usually, but not always, also farmers) and farmers.
- Local partner organizations who work daily with cooperatives and farmers.
- Your organization's field, project and MERLs team(s).
- Your organization's country team and leadership.

Importantly, software vendors, even those you have existing relationships with, would typically not be part of the solution design process and HLD review. There are 2 reasons:

- They might have a conflict of interest, as they might very well be in the running later to be contracted to deliver the digital platform that is being designed.
- You do not want to limit the design effort to define how the platform should operate to best meet user needs by fitting it into a given existing solution from a vendor.

This method of receiving detailed feedback consists of one or more expert moderators from the core team presenting the draft version of the design and deliverables and actively soliciting discussion and input on each item via group exercises. The process requires multiple working sessions with lively participation from a large group of stakeholders to truly arrive at a representative design.

For that reason, while it is possible to complete this step over virtual meetings, it is strongly recommended the conduct an in-person workshop (even considering the costs associated with one).

The "sweet spot" duration for a digital solution workshop to complete the design process, between having enough time to provide meaningful input and not requiring too large a commitment from busy resources, is 3 full working days. One option is to focus the collaborative review sessions on your staff over the first 2 days, and on the local partner(s), cooperative staff and farmers on the 3rd day.

The materials for the workshop would consist of a consolidated presentation deck that contains both context and draft solution design deliverables for the proposed digital solution. Key slides, such as the solution assumptions, high-level diagram, user journeys and functional/non-functional requirements, would be printed on large posters ahead of time. During group activities, the moderator(s) would invite participants to leave their feedback directly on the printouts using sticky notes. Typically, attendees would work in groups, with 1 person from the group then presenting the group's feedback to the rest of the participants at the end of the exercise. The moderator(s) would collect all the sticky-note input, usually taking photos.

After the workshop, the core team creates a final version of the solution design deliverables above that incorporates the new feedback. Those materials then serve as the key resource to evaluate and select software vendors.

Stage 4: Software Vendor Selection

Approximate Timeline: 2 to 3 months

Most country offices and programs already have experience selecting and contracting with software vendors to deploy digital solutions (and extensive expertise in choosing consultants for other project components). Some local offices might also have long-standing relationships with such vendors, especially those that focus on the development sector. This section will provide some additional detail specific to working with software vendors to facilitate this stage of implementing digital solutions. As mentioned earlier, we are using "software vendor" to designate the party that will be contracted and responsible for developing (or customizing), deploying and supporting the solution; as opposed to "partner," which would indicate other organizations we're collaborating with to co-design or co-implement, such as other NGOs or local partners.

What are the top-level vendor requirements for a successful digital component of your programming that provides lasting value to farmers? The software vendor must have:

- The capacity to deliver a digital product that fully meets the needs of users, as determined in Solution Design stage.
- The resources to continue to support, improve and scale the solution in the long term.

Let us examine the process of ensuring the vendor meets both above criteria.

Goal	Select a software vendor that can deliver, support and scale a digital solution that meets farmers' needs.
Objectives	• Perform a competitive analysis of vendors' available solution(s) and capacity. • Create a detailed implementation budget. • Ensure long-term platform sustainability.
Challenges	• Insufficient data about existing solutions' technical capabilities. • Insufficient information about vendors' business models. • Unrealistic platform business model assumptions.

4.1. Software Product Comparison

As discussed previously, the key approach to implementing digital solutions efficiently is to identify existing software products that meet the majority of user needs and collaborate with the vendor to enhance and customize their product to meet all the requirements; as opposed to creating new software. Such software may be deployed at cooperatives already. For example, a cooperative might already be using an accounting or Enterprise Resource Planning (ERP) package that helps them track inventory, purchase from farmers and sell to buyers or offtakers. A further requirement for an updated digital platform might be to support traceability across the value chain to enable Living Income Pricing (LIP).

The main tool to compare different vendors' products in detail is the functional (FR) and non-functional requirement (NFR) spreadsheet created in the previous stage. The core team would send the spreadsheet to the vendor and ask them to indicate which requirements their solution currently meets. By combining multiple vendors' input in a single spreadsheet, you can quickly and visually evaluate the product-user fit of each product. You can also gain an understanding of the requirement gap that would need to be filled by further development or customization, which directly affects the project schedule and budget. **A version of the FRs and NFRs should be included in an addendum to the vendor agreement after a vendor is selected, to ensure all parties are clear on the deliverables being committed.**

Similarly, clear roles and responsibilities for all parties during the Pilot Deployment stage should be included in the agreement.

Further, consider the following best-practice principles when comparing software products:

- **Data ownership must reside with the users.** The platform must make it clear, in an easy-to-understand method, what data it is collecting and how it is using the data, and enable users to easily withdraw their consent to share data.
- **Easy onboarding of users,** including support for importing other data sources, such as Excel or comma-separated value (CSV) files.
- **Leveraging open industry standards** (not open access to data) will ensure consistent access to the solution, facilitate integration with other products and prevent vendor lock-in.
- **An initial modular, extensible design** will make it easy to add farmer use cases later.

4.2. Software Product Comparison

In addition to assessing the software product itself, it is vital to evaluate the vendor's capability to deliver, maintain and support the solution in the long-term. To facilitate objective comparison of multiple vendors, we recommend leveraging a structured tool. The core team would fill out the tool after multiple conversations with all vendors.

Example comparison categories and questions within the tool would include:

Impact Acceleration and Permanence	▸ How strategically aligned is the solution to the program? ▸ What is the relative competitive advantage of the product? ▸ To what extent does the solution address gender biases and promote inclusion
Implementation Effort	▸ How complex is the implementation process of the solution? ▸ How prepared is the program for implementing the solution, considering the program timing? ▸ How ready is the solution in terms of securing partnerships and collaborations
Technicals and Team	▸ How research-based is the underlying technology of the innovation? ▸ How well does the solution address data privacy and security? ▸ What are the performance characteristics of the solution?

4.2. Software Product Comparison (Continued)

Further, consider the following best-practice principles when assessing vendor capabilities:

- **In-country support.** The same types of agriculture-focused digital solutions – for advisory, access to markets or access to finance – are found in most countries in which your organization may operate. Vendors may offer their product in multiple languages, including local ones. However, vendors must also meet the requirement of having support staff in-country who can answer questions from cooperatives and farmers and resolve issues quickly, in the local language. Inability to quickly get support when problems occur with a solution is a key reason why users abandon a platform.
- **Experience producing software and training materials** for underserved populations with lower digital literacy.
- **Current active user numbers** by region and demographic.

4.3. Budget

Typically, detailed budget development for a digital solution goes through two phases and multiple iterations within each phase:

PHASE	CREATED BY	
Initial Draft	Core Team	**Informed by:** ▸ Available funding. ▸ Platform complexity and requirements, as defined in the Solution Design stage, which would enable a high-level estimate for the number of programmers required. ▸ The gap between existing solution capabilities and user needs. ▸ Current market data, such as the average salary for a programmer or product manager.
Final Draft	Selected Vendor with input from the core team	**Standard components to ensure platform creation and delivery include:** ▸ Programmer, product and project management staff salaries. ▸ Physical office and equipment expenses. ▸ Training workshops and travel costs. ▸ Metrics and data collection expenses.

However, consider additional items required to operate the platform or make it successful such as:

- **Cloud environment costs.** This is typically a monthly expense to operate the backend application services to which users connect to via web or mobile. Your organization would typically not pay these costs directly, but it is good to be aware of them as they drive the software vendor's costs and subsequent quote.
- **Ecosystem activation expenses.** Most likely, the solution would connect with other stakeholders and/or their systems. For example, a market access platform would connect with input sellers, buyers and payment gateways; while an access to finance platform would integrate with bank systems. Bringing those stakeholders onto the platform and retaining them will require significant marketing, sales and technical outreach efforts, which carry costs.
- **Content production expenditures.** For production advisory platforms, most country teams have significant libraries of value chain-specific content. However, consider the potential costs for developing additional training videos, for example; or converting existing content into a new, more user-friendly format.

4.4. Sustainability

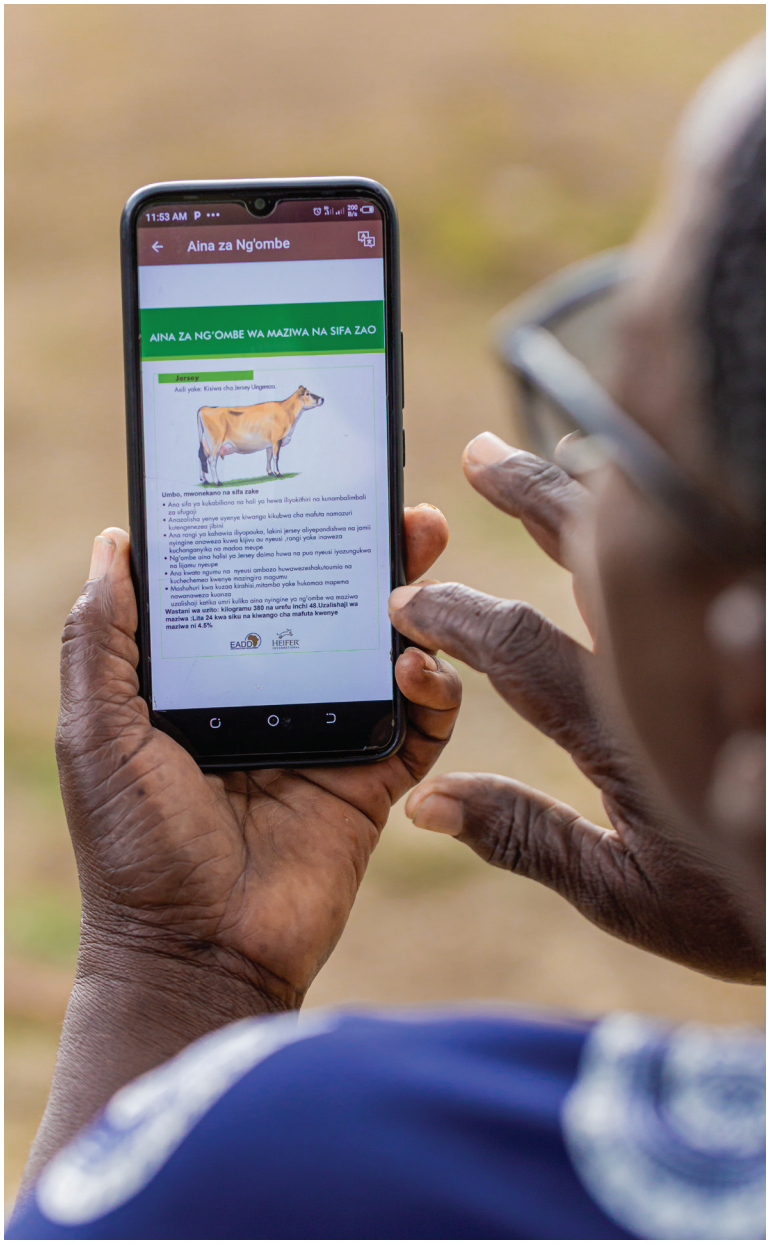
Self-sustainability is a core requirement for a digital platform if it is to deliver value to farmers in the long-term. You want a solution that will remain viable and continue to contribute to improving farmer livelihoods after the Heifer project is complete. In general, digital platforms are sustained by:

- User subscriptions.
- Advertisement revenue.
- Transaction fees, such as an e-commerce site charging sellers a percent of each sale.

In the smallholder context, subscription revenue tends to face a chicken-and-egg problem: farmers simply do not have any additional funds for an app subscription, even if they find it valuable, until the app has measurably contributed to a higher income for them. This "gap" period is typically 2-3 years, during which Heifer unrestricted and other partner or donor funding will be required to sustain the solution.

Following that period, it is strongly recommended that the platform operates as a self-sustaining business that produces enough revenue and is not reliant on continued grant funding. Only if the solution is producing enough income will the vendor be able to continue investing in improving it, keeping its capabilities competitive and responding to future farmer needs. It is imperative that the core team critically examine all assumptions being included into a platform's revenue model, such as:

- Sources of revenue.
- Number of users and retention rate.
- Annual revenue growth.
- Break-even point.
- Additional expenses associated with new revenue sources and scaling.



At the same time, to help retain users and provide an additional revenue source to farmers, the program team should advocate on their behalf with the software vendor to pursue 2 additional platform features:

1. **Referral fees.** Most digital platforms implement referrals as a method to grow their users and provide an easy in-app interface to enable them. If a user refers someone new that actively starts using the platform, the original user receives a discount on their own subscription.
2. **Farmer data monetization**. Data users input when using a platform always has monetary value in the broader digital ecosystem, and farmer data should be no exception. As mentioned previously, software vendors must ensure that farmers own their data. Further, if the vendor uses or sells the data, it should be with farmers' informed consent, and farmers should be compensated. One operational model is that farmers receive a subscription discount for contributing their data, up to using the app at no cost. This approach applies most closely to access to market and access to finance solutions.

Stage 5: Software Development

Approximate Timeline: 3 to 6 months

Unlike previous stages, in which the project team is chiefly responsible for planning and execution, in this stage that role lies with the software vendor selected earlier. You should expect the vendor to actively lead the definition and delivery of milestones, based on overall goals and timeline your organization sets. Yet, it is vital that you remain a keenly engaged advisor to the vendor throughout the process to ensure the digital solution is delivered on time, fully meets documented requirements and is thoroughly tested internally before being deployed with farmers. That process starts with the team and the development plan.

Goal	Deliver a digital platform, on time, that is fully functional and meets the needs of users.
Objectives	• Produce development and test plan. • Create minimal viable product (MVP) and iterate. • Thoroughly test software before release. • Deliver final tested version of digital solution.
Challenges	• Development delays due to infrequent or incomplete communication between parties. • Non-functional or “buggy” software components because of insufficient testing. • Insufficient user feedback or lack of responsiveness to it.

5.1. Team and Communication

After careful evaluation and selection in the previous stage, you should walk into the software development (or customization) stage with the trust that the vendor is an expert at digital product development, testing and deployment. They should have the freedom to leverage their preferred process, tools and communication style. At the same time, you should expect them to produce timely deliverables, provide frequent, scheduled updates and be responsive to questions and (reasonable) requests. The vendor has the responsibility to deliver a suitable, functional product on time; while you have the responsibility to monitor and advise that process, so that any misalignment is resolved early and does not affect the final timeline and quality.

The key overall team members during development are:

- The vendor project manager (PM). You should expect the company to designate a dedicated PM for your project, who will provide regular updates and serve as the single point of contact (SPOC) for any questions or issues from your organization or partners.
- The product owner. Larger vendors will have a product owner, who is responsible for overall design and rollout of the solution outside of a specific project.
- The development lead. This is a senior software engineer, who is responsible for the overall architecture and functionality of the product, delivering detailed technical guidance to the rest of the development team and providing technical updates to stakeholders.
- The test and/or quality assurance (QA) lead. This is a senior test engineer, who is responsible for the overall quality and performance of the product and delivering updates during the test phase.
- The Heifer core team members.

In terms of checkpoints or updates, you should expect the vendor PM to schedule and lead following meetings, while also bringing in other resources to participate as appropriate:

- A weekly or bi-weekly checkpoint with the PM, the Heifer core team and any other vendor staffers as needed. The purpose of this meeting is to provide detailed ongoing updates and resolve any outstanding issues.
- A monthly checkpoint with the PM, development lead or test lead, Heifer core team and other interested Heifer parties, such as the program or MELs team. The purpose is to provide high-level milestone updates and ensure overall alignment.
- A quarterly checkpoint with the PM, Heifer core team and leadership from Heifer and the vendor. The purpose is to provide overall project updates and answer high-level questions.

5.2. Development Plan

The vendor PM, with assistance from the development lead and other staff as needed, has the responsibility to generate the development (dev) plan, review with Heifer and make respective updates. Meanwhile, Heifer would provide guidance on overall timeline and expectations. The purpose of the development plan is twofold:

- It presents a clear roadmap to the stakeholders (program team, local partners, cooperatives, farmers) of when different platform capabilities (functional requirements, or FRs) will be delivered.
- It provides a high-level deliverable to the vendor's programmer team, from which a more detailed (low-level) breakdown of each FR's components can be generated to assign tasks to each engineer.

While the vendor should have the flexibility to use their preferred tools (such as Confluence or Trello for the high-level plan and Jira for individual dev item tracking), the plan should include key elements, such as:

- Clear timeline and duration (typically in development sprints) for the completion of each FR, which in software dev translates to an epic. Epics break down into individual stories, which are assigned to engineers for execution.
- Milestone dates, including MVP delivery.
- Test, user feedback and iteration schedule.
- Risks and mitigation.

5.3. Test Plan

You should not underestimate the amount of (internal) testing required to produce a fully functional app that will immediately leave users with a positive experience. Comprehensive testing by the software vendor is a mandatory step of development and you should expect to see and provide feedback on a detailed plan. The test and/or QA lead would create this document, present to the core team in a review session and make necessary updates afterwards. Creating and executing a complete test plan should be included among the vendor's responsibilities in the agreement.

Once again, the vendor should enjoy some freedom on the format and tools; still, you should look for certain required elements:

- Clearly defined test cases and success criteria.
- Unit testing of each module or component.
- Performance stress testing.
- Regression testing of overall user workflows and functionality.
- Security testing.

5.4. User Experience

While smallholders in general experience a lower level of smartphone ownership – that is one of the parameters of the digital divide we aim to close – in many countries a significant percentage of them have at least one in the household, and the number is growing. When asked what apps they use on their phones, universally they indicate: "YouTube, Facebook, TikTok, WhatsApp."

Consider farmers' user experience (UX) with those apps and what was required for farmers to adopt them. No one provided any training on those solutions. The apps are so easy to use and provide such a good UX and value that smallholders have quickly embraced them with no deployment or training efforts on behalf of the software vendors. While those apps are simple and refining them took thousands of highly skilled professionals, they are still the gold standard: your goal for the digital solution you are implementing should be to provide as good a UX as the most popular apps.

Let us examine four methods to achieve that goal. All these approaches should be driven by the vendor, but guided and facilitated by your organization, and they can be used in combination:

Hire a UX Consultant	Because we usually aim to expand and customize an existing digital platform, you should discuss with the software vendor the option of hiring a UX expert to review user needs with fresh eyes and create a design an improved UX for the next version. Note that this is an expense that must be factored into the budget, as well as a time commitment that must be accounted for in the overall timeline. You should not expect the overall UX research and design to take more than two months. The core team has a critical role to play here in advising the consultant, because they will most likely not have the full context of what the smallholder-specific user needs are.
Conduct a UX-specific Survey	Collaborating with the software vendor, you can create and administer a tactical survey focused on farmers' UX with the previous version of the platform (if applicable) and/or with digital solutions in general. The vendor would take the lead in generating the survey, while the program team would facilitate the data collection via its field team(s). Keep in mind that questions should be structured to provide you specific insights on platform component design.
Hold an In-person UX Feedback Session	More time-consuming and costly than the previous option, but also more valuable in receiving high-fidelity feedback, you can schedule a UX feedback workshop at a cooperative. With a duration of 2-3 hours, the session would consist of demonstrating the current version of the app to farmers and soliciting direct feedback on different UX elements in a structured discussion.

Leverage AI to Generate User Interface (UI) Mockups	At the time of writing, AI's ability to generate UI mockups has not obviated the more comprehensive approach of hiring a UX consultant (who might, in turn, use AI for part of their work). However, as an initial step to discuss UI themes or spark additional ideas, leveraging AI to generate basic UI mockups of your app holds significant value.

To ensure those mockups drive directly from farmer feedback, you can follow these steps:

a. Voice-record (with participants informed consent, of course) an in-person UX feedback session.

b. Pass the recording file(s) directly to a comprehensive generative AI (GenAI) service like ChatGPT or Gemini and ask it to summarize key feedback points and farmer needs, then create mobile app UI mockups based on that summary.

c. Alternatively, if that approach does not work for technical reasons, first use a specialized AI service to transcribe and (if desired) translate the discussion, then pass the results to the comprehensive GenAI service.

5.5 Minimum Viable Product (MVP) Release and Iteration

To deliver a final version of the platform that fully meets user needs and delivers a superb UX, you should present an interim product version to them as quickly as possible, solicit their feedback and make corresponding modifications, iterating through this cycle multiple times. That interim version is the MVP – a functional version of the software that implements all the core features and enables hands-on testing and input by users. Once again, the definition and delivery of the MVP are the responsibility of the software vendor; while the core team provides feedback and organizes the user feedback sessions with farmers. What are some key considerations for delivering and testing the MVP?

- Start with a focus group of 1-2 cooperatives that are more digitally advanced to minimize general capacitation required and shorten the timeline; while understanding that other cooperatives might need more training during general rollout platform rollout.
- Ensure farmers get sufficient hands-on time with the app and can explore all major functions.
- Provide instructions in terms of goals to achieve that mimic real user scenarios, such as, "register your coffee lot," or "list your tomatoes for sale;" and not in terms of specific steps to take in the UI.
- Employ structured questionnaires for consistent data collection.
- Combine questionnaires farmers would answer (in writing or verbally) with observations that are recorded in separate data intake forms by project staff.
- To increase engagement, follow up with the MVP participants, demonstrate how their feedback has influenced the current version of the software and ask for additional input.

5.6. Final Release

To deliver a stable final release that will immediately provide a great UX, you should ensure that 1-2 months before the release date all development of new features is paused. The focus should be on:

- Fully executing the test plan.
- Creating a clear backlog of smaller product items that did not make the final release to guide the next stage of development.
- Defining the deployment plan based on already developed functions.
- Ensuring the user support structure is in place at the start of rollout.
- Completing ecosystem activation (see next section).

Of course, this is the final release (sometimes referred to as the "generally available" or "GA" release) for this development cycle. The expectation is that the software vendor will continue to both make small improvements based on farmer feedback during deployment and generate a plan for the next set of features during the following dev cycle.

Stage 6: Ecosystem Activation

Approximate Timeline: 1 to 2 months

In most cases, a digital solution's success will depend on successful connections to ecosystem partners in addition to the software vendor delivering the platform. For example, a traceability solution aimed at securing better prices for farmers will rely on processors and buyers inputting data and exporters consuming data from it. Alternatively, a market access platform attempting to connect farmers with input sellers and buyers will need to ensure their buy-in and active participation, both to deliver value to all parties and to contribute to the technology's sustainability in the form of transaction fees.

This type of activation is part of most non-profits' overall systems approach, and they have well-established partnerships with ecosystem participants in the countries in which they operate. In this section, we will examine some considerations for an ecosystem approach to solution design, as well as offer some specific case examples to establishing and maintaining stakeholder engagement. These activities are performed in parallel with the Software Development stage and before the Pilot Deployment stage.

Goal	Ensure required ecosystem partner participation in the solution.
Objectives	• Determine stakeholder needs for participation. • Identify required platform and deployment plan components to meet needs. • Prepare ecosystem for solution deployment.
Challenges	• Lack of awareness of how ecosystem partners would interact with the system. • Timeline and cost impacts of required partnership activities. • Difficulty in obtaining buy-in from market actors, especially more information security-conscious ones.

6.1. Ecosystem Mapping

Most digital solutions interact with value chain or ecosystem actors in addition to their core users (farmers, agrovets, cooperatives). These actors contribute to the solution by entering data into or consuming data from it. Considering the stakeholders early in the design process is crucial for a solution's success. This allows for early partnership activation and co-design. Additionally, this should also inform the vendor selection process covered in Stage 4. For example, a software vendor with robust partnerships and connections with local community stakeholders should be favorably assessed. Key questions to consider when mapping out the stakeholder ecosystem include:

- What kinds of stakeholders are needed for the platform to provide immediate value to your users (producers, cooperatives, etc.)?
- What are the different services that the platform provides, and which stakeholders are needed to fulfill those services?
- What stakeholders are required to contribute to the platform's successful design but may not necessarily interact with it? An example of this is an agronomist providing localized input for a digital extension solution application.

6.2. Stakeholder Engagement

Once you have mapped out your stakeholder ecosystem, it is time to get them engaged. While the nature of the engagement will vary, once a partnership has been established, it can be useful to involve ecosystem actors in the following situations:

- During focus group sessions with users to further inform the platform design, services offered, and/or user journey. This can also be helpful with validating assumptions around required features and the overall business/service model.
- During research studies and assessment activities, as described in Stage 2, to enrich the data collection and analysis process.
- In conversations with prospective funders or government alliances, where stakeholders can provide valuable support and credibility in these discussions.

While stakeholders provide valuable insights, they should not be directing the solution design. Your core users should be the primary informants of the design. Sometimes, software vendors may push features that are easy to build or already developed for another solution, presenting them as concrete (but not necessarily needed) deliverables. To prevent this, complete the functional and non-functional requirements, mentioned in Stage 3, independently before engaging a software vendor in any solution design conversations.

CASE EXAMPLE: INPUT SELLERS AND BUYERS

Core tenets to access to market digital systems are decreasing farmers' expenses when acquiring inputs and increasing the price they receive for their production. Typically, this happens by connecting farmers with additional input sellers and buyers in an online marketplace, accessible by all parties via a mobile app.

The key questions we need to answer to engage these market actors in a digital solution are:

- What are their needs associated with a digital platform?
- What are their barriers to entry?
- How can we address those barriers?

Input sellers and buyers need to perform the following categories of actions on a digital platform:

- **Manage inventory:** list their products (input sellers) or view farmer products (buyers).
- Place or receive orders.
- Arrange delivery or logistics.
- Send or receive payment.

Their barriers to entry are:

- Awareness of the platform.
- Digital literacy and device availability.
- Lack of mobile apps with great user experience (UX) to add their products or view available commodities.
- Lack of digital integration with transportation or logistics companies.
- Inability to send or receive digital payments.

Case Example: Input Sellers and Buyers (Continued)

Addressing those barriers begins with marketing and sales efforts to input sellers and buyers to make them aware of the platform and its benefits for them. Think of the advertisement and one-on-one outreach efforts major digital companies must employ to reach users for their platforms. While on a smaller scale, a similar campaign will be required, and the time and cost required should not be underestimated.

Further, making them aware is only the first step. To become active users, these market actors will require at least two rounds of dedicated demonstration and training sessions. Those workshops will give them a chance to receive hands-on experience with the platform (possibly an early version under a confidentiality agreement), ask questions and provide feedback. That feedback should then be incorporated into the platform development iteration cycle. In most cases, these sessions will need to be held in person, preferably in smaller groups.

It is more difficult to address systemic problems, such as device availability, lack of logistics integration or low adoption of digital payments, within a single project. Resolving those challenges overlaps with non-profits' overall facilitation and partnerships efforts in most countries; additionally, the platform itself could help stimulate growth in digital finance. Within the scope of the project, consider a phased approach that combines digital with physical execution. For instance, an easier barrier to overcome is enabling sellers and buyers to advertise and view goods on an app and initiate a transaction; then close the transaction and exchange payment offline.

CASE EXAMPLE: EXPORTERS

Naturally, engaging exporters with a farmer-focused digital platform is applicable to those countries with export-oriented value chains, such as coffee and cacao/cocoa. The category of farmer need and solution is most often traceability, with the goal of gaining access to premium markets (such as those governed by the European Union Deforestation Regulation, EUDR) and the associated premium pricing. For example, to advocate for Living Income Pricing (LIP), one option is piloting a new traceability model of integrating cooperative-level digitization and last-mile data collection with a large exporter's existing traceability system to account for farmers' true cost of production and work towards an LIP price for coffee.

In addition to developing a partnership business model beneficial to all sides, what are some key requirements for obtaining buy-in and active participation in a farmer digital solution from large exporters?

Open, transparent standards. While keeping data secure and private, it is important to leverage open standards both in the solution economic framework (such as formulae used to calculate LIP) and in its digital architecture (such as data format). With a transparent economic framework, all value chain participants (including consumers) can have confidence in the results. With open data standards, different digital platforms can much more efficiently exchange information to operationalize the business model. One example is ensuring solutions have available, documented connection points, or Application Programming Interfaces (APIs), based on an industry standard such as Representational State Transfer (ReST).

Automated data exchange. Optimizing inefficient, multi-step, paper-based information exchange between parties is a key goal of most digital systems. The approach used is to ensure that as many steps as possible – from initial data collection to verification to exchange with other platforms – are performed automatically, by the digital platforms involved. In the traceability use case, one example would be integrating first-mile farmer data collection mobile apps, cooperative Enterprise Resource Planning (ERP) systems and exporter traceability platforms, all via open-standard, secure APIs.

Brainstorming and implementation sessions. In addition to business model-oriented workshops, implementing the above solution integration best practices will require a series of digital technology-focused sessions. To create a multi-platform integration architecture and generate a plan for implementing it, you should involve the following parties:

- Cooperative technical representatives from those cooperatives that have already implemented ERP systems.
- Heifer country and field teams.
- Local partners.
- Exporter sales and logistics teams.
- Exporter information technology (IT) team.
- Any software vendor(s) whose systems are being used.

CASE EXAMPLE: BANKS

Key objectives of access to finance (A2F) digital systems include simplifying and speeding up existing loan application processes and making formal bank loans more accessible for farmers. Despite much lower cost of capital, bank loans are taken out by farmers significantly less frequently, typically because of more extensive verification requirements and a lengthy loan process that often obviates the need for the funding.

Integrating a farmer-facing digital platform with existing bank systems can serve a dual purpose in improving A2F: it can provide geolocated information on available loan products and greatly optimize the loan application and approval process. To perform the former, a digital solution would need to automatically collect information on existing loan instruments from publicly available sources provided by the bank, such as websites. To accomplish the latter, a platform would have to securely integrate with a bank's loan processing system. Note that we are not suggesting "complete synchronization" or "complete access" to a bank's system from an external solution: that would never happen for security, privacy and legal reasons. Instead, a farmer-facing A2F platform can optimize the loan process by collecting, verifying and submitting loan applications to the bank's existing software.

To accomplish such integration, the 3 requirements from the Exporter section above – open standards, automated data exchange via API and joint workshops – play an even more important role, considering a bank's conservative security posture. For the required working sessions to design and plan for a joint digital architecture, in addition to the parties listed above, you should expect multiple meetings with the bank's security team. You should expect to produce comprehensive documentation that describes both business logic and software changes to their existing loan process, and how those proposed changes comply with their security and legal requirements.

Stage 7: Pilot Deployment

Approximate Timeline: 2 to 3 months

All the months of planning, resource mobilization, research, software development and testing have led to the deployment stage, when you can start delivering value to a larger group of users, such as farmers, cooperative staff or agrovets. As you are considering rollout preparation, product launch and post-launch activities, several questions might come to mind:

- What are the required components of a digital platform deployment?
- How can you increase the chance of success, minimize inefficiencies and prepare to deal with challenges?
- What does a launch checklist look like?

This section answers the above queries and describes the digital solution rollout sequence, starting with creating the deployment plan.

Goal	Successfully deploy platform to the correct user population and deliver excellent user experience (UX) and value to them.
Objectives	• Create deployment plan. • Prepare for rollout. • Launch solution. • Support users and increase engagement.
Challenges	• Software bugs. • Insufficient or slow user support. • Logistical challenges with training workshops. • User retention.

7.1. Deployment Plan

The software vendor, based on their previous experience implementing digital solutions, has primary responsibility for generating the deployment plan. The core project team would provide key district-, cooperative- and farmer-specific execution context and details and approve the plan. During implementation, your organization would typically be responsible for the majority of long-term deployment activities, while the vendor leads key execution items surrounding launch and provides close collaboration and user support throughout the pilot. As mentioned in the Software Vendor Selection stage, those responsibilities should be clearly stated in the vendor agreement.

The minimum required elements of a platform deployment plan are:

- Ecosystem activation and marketing (covered in the previous section)
- User pool selection
- Platform availability
- Communication plan
- Product documentation
- Training materials
- Initial training
- User onboarding
- Support structure
- Follow-up training
- User engagement
- Metrics and impact (covered in the next section)

Let us provide some additional context for each element.

USER POOL SELECTION

Core tenets to access to market digital systems are decreasing farmers' expenses when acquiring inputs and increasing the price they receive for their production. Typically, this happens by connecting farmers with additional input sellers and buyers in an online marketplace, accessible by all parties via a mobile app.

Top-level factors determining the success of a digital platform pilot for smallholders are:

- Selecting the optimal user pool.
- Providing sufficient training and support.
- Delivering measurable financial value to ensure long-term engagement and sustainability

In turn, the key criteria governing user selection are overall digital literacy and mobile device ownership, typically cheaper Android smartphones for most digital solutions. During the Software Development stage, you identified 1-2 more digitally advanced cooperatives to serve as focus groups for early feedback and iteration. For the pilot, identify the next group of cooperatives that have digital technology experience and whose members have at least one smartphone in the household. During the scale-out period, you can more effectively reach all cooperatives and farmers with whom you are collaborating by synthesizing the learnings from the pilot, making software adjustments, delivering additional digital literacy training and exploring device manufacturer partnerships to boost smartphone adoption.

Two additional factors to consider are the district presence of the software vendor and your organization's local partner infrastructure. Both groups will have a key role to play during and after product launch, so their local capacity will also guide user pool selection.

PLATFORM VIABILITY

How can users get the software? The vendor has the responsibility of ensuring that the platform is easily available for download either in the Google Play Store (usually not the Apple App Store because of the iPhone's higher cost) and/or a separate website if the distribution form factor is Android Package Kit (APK). The vendor must provide instructions for download in the communication plan and installation guidance in the product documentation.

COMMUNICATION PLAN

A joint responsibility of the software vendor and your organization, this document specifies how all platform stakeholders – including users and ecosystem actors – will be notified of the product's release and implementation activities. The approach should be omni-channel as locally appropriate, leveraging press releases, social media posts, cooperative and stakeholder meetings and word of mouth. As with other projects, the plan should capitalize on the role of the cooperative as an information and business hub.

Key items in the communication strategy include:

- Name and purpose of the digital solution.
- Target audience and value the platform delivers for that audience.
- Where users can download the software and how they can get started.
- Dates and locations of enablement activities, such as workshops.
- Where users can access training materials.
- Where users can turn for support.

PRODUCT DOCUMENTATION

A basic requirement for any software is the product documentation, usually referred to as the user manual, though occasionally as the release notes (which can also have the narrower connotation of a high-level summary of features for that release). The manual must provide step-by-step instructions for all user workflows on the platform, starting with sign-up or registration and password reset. Those instructions must include screenshots for every step in the process with thorough explanations of each visual element, and not just shorthand comments similar to, "Tap here next."

The software vendor has the responsibility to produce, review with the program team, update and translate the user manual into local language(s) as needed. Note that a single digital solution will likely have multiple manuals for different interfaces and users, such as a web app guide for cooperative staff and a mobile app guide for farmers.

Note that the user manual is not the primary training deliverable for users. Even translated into local language, the user manual is best suited for:

- Advanced users with significant digital experience, such as local partner staff, master trainers or technical staff at larger cooperatives with a substantial digital footprint.
- A quick reference or reminder for a specific action after users have receive comprehensive training.Where users can turn for support.

TRAINING MATERIALS

Consistently, the most successful, requested and used software training materials for all users, including smallholder farmers, are videos. They are the primary user education deliverable during the pilot. Most non-profits engaging with smallholders already have an extensive history of producing advisory or agronomic training videos, and those best practices should be leveraged for digital solution training. Unlike with advisory content, responsibility for creating software education videos rests with the vendor, with the core team once again in the role of a reviewer and approver.

Here are some additional suggestions for producing effective software training videos:

- Duration: 2-5 minutes is optimal to sufficiently cover a scenario.
- Scenario-oriented, not screen-oriented: each workflow shown should focus on the user accomplishing a meaningful task; not on reviewing the elements and functions of a particular screen.
- Focused: one scenario or workflow per video.
- Visual cues, such as arrows or highlights, to draw attention to actively used elements.
- Narration and captions in the local language to provide multiple information channels and accommodate different literacy levels.
- Quality production, especially in the audio elements.

INITIAL TRAINING

Following the preparation steps above and an official platform launch event (if appropriate; not covered here), the pilot deployment truly starts with the first user training sessions. Prior to engaging with users, it helps to develop and follow a launch checklist to ensure that all elements are in place for a successful implementation once the process commences.

Major elements of a launch checklist include:

- Name and purpose of digital solution.
- Product onboarding
- Personas and their data
- Application function and user experience
- Content availability and stakeholder information
- Development and testing results
- Support team and process
- Internal communication process
- External launch details
- Metrics
- Post-launch feedback

Next, let us explore some key considerations for conducting the initial round of product education.

ORGANIZATIONAL STRUCTURE AND STAFFING	Who is delivering the training? The built-in assumptions here are: you would leverage your organization's existing in-field relationships with local partners and cooperatives; and the software vendor would play a key role in conducting the sessions, such as showing demonstrations. However, depending on the user pool size, geographic reach and number of training sessions, it might be impossible for qualified vendor staff to perform that role at most events. Instead, the most practical method might be the train-the-trainer (T3) model, in which vendor experts hold an in-depth workshop with a group of your field staff, local partners, community facilitators and/or other master trainers. Those trainers then lead farmer workshops at cooperatives. Keep in mind that all master trainers would be required to have an advanced level of digital literacy and their own smartphone.
DURATION	Because the training sessions will be in person, there is always a tradeoff between cost – for the farmers, both in terms of time and potentially travel expenses, and for your organization and/or partners – and having enough time to conduct comprehensive training at the right pace. To truly give participants a chance to understand the platform, get hands-on experience with it and engage in discussion, you should plan for 2 hours per major feature or module. Consider finishing each section with an informal "quiz" – asking participants how they would accomplish a real-world scenario on the app. If we assume that most training sessions would be at a cooperative or self-help group (SHG) meeting room, and participants do not have to travel far, one option would be to schedule a ¾-day workshop over 2 days, instead of 1 longer day. This approach would still give attendees a portion of each day for other tasks; though its applicability would depend on the local circumstances.
FORMAT AND MATERIALS	Sessions must include not only demonstrations, but hands-on experience with the platform for participants. This may require additional communication and planning to ensure that each participant has access to a smartphone during the workshop. As with separately available training videos, topics should be scenario-oriented, and not just showing the features of the app: each unit should be structured around participants performing a real-life task pertinent to their work. As in other workshops, accompanying printed materials should show the detailed steps of each scenario, including answers to any "quizzes" you include to test attendees' understanding. Lastly, if at all possible, record the training sessions and make them available on YouTube.

USER ONBOARDING

A primary method for onboarding users (or user acquisition) would be during the training workshops. That is a perfect opportunity to register users, resolve any sign-on or password issues and share information on other available training resources and the support process to seek help.

Let us examine three additional onboarding avenues:

1. **Farmer data or profile import from an existing software system, such as a loan management or ERP platform.** As discussed in the Software Vendor Selection stage, an essential feature for candidate platforms is the capability to easily import data from other sources, particularly comma-separated value (CSV) files. Administrator (admin) users of the new digital solution – such as cooperative staff, Heifer field team member or local partners – should be able export farmer information from the existing system in a CSV file and import it into the new solution.

2. **In-person registration at cooperative or SHG.** At regular cooperative meetings, an additional agenda item could be introduction of the new platform and its value, user registration and a mini-training session highlighting how to access training materials such as videos.
3. **Word-of-mouth growth.** For any platform, organic user acquisition is a key target. There are both in-app and operational methods to support that goal:
   - A user interface that makes it very easy to find training and get help with issues.
   - Communication from cooperative staff, your organization or local partners on the value of the solution and available training.
   - As also discussed in the Software Vendor Selection stage, a referral model that rewards users for registering others.

SUPPORT STRUCTURE

As mentioned previously, a top reason why any digital solution fails to gain traction is lack of fast, user-appropriate support.

There are two main types of assistance farmers would be seeking in relation to a digital platform:

1. Help with problems faced while using the app, such as features not working or producing unexpected results.
2. Subject- and value chain-specific aid.rewards users for registering others.

In this section, we discuss a recommended support structure and different stakeholders' role in it.

SOFTWARE VENDOR	The chief responsibility for providing platform-related support rests with the vendor, and that commitment must be included in the vendor agreement. The necessity to provide that assistance in the local language and timezone directly leads to the requirement that the vendor have sufficient in-country presence for their support staff and, preferably, engineers.

The first avenue of support the vendor must provide is a direct connection to their developers during the product launch and first series of training workshops. There is no expectation that the vendor sustain this level of assistance in the long-term, but the launch is a critical period to ensure solution success and any issues or software bugs must be fixed immediately. The vendor must designate one person, typically the project manager (PM), to act as the single point of contact (SPOC) for platform issues and make their contact information available to the core team and local partners. The vendor must also plan accordingly, so that engineers are available to quickly fix problems raised by the SPOC and release new versions of the app.

Post-launch, you will transition to the standard support model agreed on with the vendor. Typically, that involves:

- An in-app feature that enables users to easily raise issues ("create support tickets") and receive resolution.
- Providing and staffing a phone number that users can use to call or send a Simple Messaging System (SMS) message.

The required response time for those support methods should also be included in the software vendor agreement.

COOPERATIVE STAFF	Implementing or enhancing a digital solution provides an opportunity for the cooperative to expand its services for members and become a digital technology hub. Building on existing social capital, farmers can turn to the cooperative for assistance. Specifically, a cooperative may designate one or two staff members to be "digital technology experts" and provide first-level assistance to members. While larger cooperatives with existing digital systems might already have one or two staffers with that responsibility, this could be a feasible model for smaller cooperatives, as well. The "digital technology experts" would receive additional, focused training from the software vendor, Heifer or a local partner, and get an opportunity to grow their skills, potentially adding to their income in the future. Alternatively, in some countries, local partner staff has taken on the role of first-level support as part of the services their provide cooperatives, supported by a non-profit.
ONLINE COMMUNITY	Building social capital on the platform itself can add to your organization's existing efforts, provide production and digital assistance to users and increase engagement with the solution. One example of this for farmer-facing apps is a "community" section where farmers can share best practices, ask questions and connect socially. Such platform components can be an avenue for peer-to-peer learning or expert support from community ecosystem stakeholders like agrovets, banks, and local vendors. Additionally, cooperative staff and farmers can create new groups related to the platform on existing social media they use. However, the design for this type of online engagement must account for the danger of technologically-facilitated gender-based violence.

ARTIFICIAL INTELLIGENCE (AI)	Multiple digital solutions have emerged whose goal is to simplify how smallholders receive advisory and significantly decrease the cost of supplying that advice. Those platforms rely on three main components: 1. **A chatbot interface, such as WhatsApp or Telegram.** Farmers can type or speak their question or problem, in the local language, directly into WhatsApp, removing the need to train them on another app interface. 2. **AI software (an "AI model")** is then responsible for correctly interpreting the question and generating a correct text or video answer back to the farmer through WhatsApp. 3. **A backend database of agronomic content** specific to that country, state, district and value chain, which the AI model uses to create the answer. Local availability of such solutions is growing steadily, largely dependent on having access to specific value chain data. This is a very promising development for optimizing how smallholders might more easily get access to all types of services in addition to advisory. A great example at the time of writing is Farmer.chat.

FOLLOW-UP TRAINING

In discussion with many program teams, they emphasize that multiple rounds of farmer training are needed when implementing a new solution, digital or not. For a digital platform, it is recommended that you plan on conducting follow-up training 2-3 months after the initial workshops. It is adequate time so that cooperatives and farmers have had a chance to experience the solution and can provide feedback, while at the same time not taking too long a gap and sustaining momentum.

Make follow-up training sessions specific and not a restating of the initial education, focusing on challenges users are experiencing. Considering time and cost for all parties, a half-day workshop should be sufficient.

To inform session content, perform informal research with cooperative staff and local partners, asking questions such as:

- Are you hearing that farmers are using the app and are you receiving questions about it?
- What is their informal feedback?
- What are app components that seem to work well?
- What are features or scenarios they are struggling with?

Use the training as an opportunity to onboard additional users and demonstrate solutions to common problems, such as password retrieval.

USER ENGAGEMENT

We previously touched on user acquisition – the initial registration of farmers, agrovets or cooperative staff. However, only a certain percentage of those initial users actually start actively using the solution, becoming daily or monthly active users (DAU or MAU). Every digital platform aims to raise and then maintain that percentage during the user activation and retention periods via improved user engagement.

What are some user engagement strategies for the pilot deployment?

- Ensure the app is delivering a personalized experience, with information and features specific to the farmer's location and value chain(s).
- In addition to training resources discussed previously, include tutorials and how-go guides within the platform.
- Analyze user data to identify areas for improvement (see Metrics and Impact stage).
- Make regular updates and improvements, particularly those driven by user feedback.
- Employ push notifications (sparingly) and rewards programs. Those can include referral fees or vouchers for internet data in partnership with local telecom providers.
- Use gamification features in-app, such as progress bars or digital recognition for advisory lessons watched, agrovet appointments scheduled, transactions completed, or loan payments made.
- Leverage your existing local partner and cooperative infrastructure to maintain awareness, solicit feedback and encourage users to share their experience on social media.

Stage 8:
Metrics and Impact

Approximate Timeline: 2 to 3 months

The purpose of a digital intervention is to augment local programming efforts in achieving your organization's goals, as measured by benchmarks established by your Monitoring, Evaluation, Research and Learnings (MERLs) team. Therefore, a digital platform's success will contribute to a program's impact, as determined by your existing tools and processes. But how can we quantify the specific additional benefits that farmer-facing digital technology is delivering? And how can we compare the effectiveness of different digital solutions?

Let us explore those questions in the discussion below. The assumption is that the methods outlined below are implemented in collaboration with local MERLs teams, using your infrastructure and enhancing your capabilities.

Goal	Determine the unique impact of digital components of programming and enable solution comparison.
Objectives	• Collect digital platyform metrics during deployment. • Evalue solution impact post-deployment.
Challenges	• Visualizing and exporting in-app data. • Logistics of conducting farmer surveys and studies.

8.1. Deployment Plan

When designing an app, three important capabilities to measure its success are:

1. Collecting in-app user and performance data.
2. Producing easy-to-use reports and dashboards to consume those data.
3. Enabling easy sharing of data, such as via export or API.

Data gathered in-app are referred to as telemetry. Such data should be collected continuously (with fully informed user consent) and typically can be visualized on the platform or exported for analysis at any time. We recommend that you analyze telemetry at least at the 3, 6, 12 and 24-month mark during the pilot deployment, depending on its length.

Key telemetry metrics include:

- Initial registered users (number of users who have signed up for the platform)
- Initial active users (number of users who have performed 3 transactions on the platform)
- Seasonal active users (SAU, or total number of users in a given production season)
- Cycle active users (CAU, or total number of users in a given production cycle)
- Seasonal churn (total number of users that drop out in production season)
- Cycle churn (total number of users that drop out given production cycle)
- Seasonal retention rate (total users from season - seasonal churn / total users from season)
- Cycle retention rate (total users from cycle - cycle churn / total users from cycle)
- Season-to-season retention (SAU from season (a) that are also SAU in season (b) / original SAU from season (a))

8.2. User Surveys

If you review the metrics template above, you will notice that not all data points are telemetry: other examples include value and affordability for users. During the pilot deployment, such information would be collected via targeted user surveys. Naturally, those surveys should be conducted in the local language and preferably in person. The recommendation is to use your existing in-country MERLs infrastructure to also collect and record the digital solution metrics.

8.3. Impact Studies

Towards the end of the pilot, you should conduct a more comprehensive digital platform impact study to gauge its overall effectiveness. Typically, a local research consultant would be hired to conduct this larger survey; once again, the in-country MERLs team typically has the connections and expertise to identify and evaluate potential candidates. Several additional criteria to keep in mind when selecting a digital solution consultant include:

- Naturally, specific expertise in evaluating digital technology use.
- Ability to not only ask survey questions (preferably in person), but also conduct observations of how users are interacting with the digital platform, in order to collect accurate data on digital literacy, solution-specific skills and challenges encountered.
- Ability to perform data analysis and create a comprehensive report highlighting example user profiles, trends and key overall takeaways.
- Ability to share the raw response data in addition to the report.

Stage 9: Scaling

Approximate Timeline: 2 to 5 years

You have had a successful pilot deployment of your digital solution and you have measured its additional impact for programming in support of the organization's goals. It is time to perform a project retrospective and explore the considerations for scaling the digital intervention to bring the same value to a much larger user pool.

This section explores creating the ***strategy*** for the scaling stage.

Goal	Learn from the pilot deployment and create the foundation for scaling the digital solution.
Objectives	• Perform digital project retrospective. • Define key elements of your scaling strategy.
Challenges	• Training and support staffing for a larger user base. • Platform business sustainability. • Scaling Budget.

9.1. Digital Retrospective

As with other projects, during the final two to three months of the pilot period, the Heifer core project team should perform a digital solution retrospective, setting the stage for a faster transition to scale at the end of the period. In collaboration with other stakeholders (e.g., the overall program and MERLs teams), the core team should prepare a report for country and regional leadership, covering elements such as:

- Platform key performance indicators (KPIs)
- Vendor selection
- Design process
- Development and testing
- Deployment and capacitation
- User feedback and platform improvements
- Impact data

9.2. Scaling Strategy

Let us examine some key building blocks of a successful digital solution scaling strategy.

PLATFORM TECHNICAL IMPROVEMENT

A key action item from the solution retrospective should be improving the platform based on user feedback. Consistently trending user comments or requests should be converted into backlog development items and prioritized alongside previously planned enhancements. You should pay special attention to system performance: a solution that handled interactions from 10,000 farmers admirably would not automatically scale well to 100,000 or more users. Consider the following 3 elements of ensuring proper system performance; their execution is the responsibility of the software vendor with core team review:

1. Conduct a thorough solution architecture review, identifying any software implementation decisions that could restrict scaling.
2. Focus on performance tests exceeding the number of users you expect to enroll in the scaling stage.
3. Adjust the resources of the cloud environment operating the platform accordingly. Note that this item will significantly affect the budget for the next phase.

EXPANDED USER POOL

Assuming the end goal is to scale the platform out to all farmers and cooperatives within the country (and potentially regionally), you should consider a multi-stage approach to expanding the user pool, grouping potential users into tiers based on the following criteria:

- Digital literacy and smartphone ownership.
- Cooperative digitization level.
- Local partner and software vendor support infrastructure.
- Value-chain fit.
- Market system development level.

TRAINING AND SUPPORT INFRASTRUCTURE

With a considerably higher user pool come the requirements for corresponding adjustments in the training and support structure. In addition to recruiting additional master trainers and providing in-depth education to them, consider the need to create and deliver precursor training to new users. If you selected cooperatives and farmers with higher digital skills for the pilot, as recommended here, additional base digital literacy training might be required for new users before continuing with the education from the initial period. Simultaneously, the software vendor must evaluate and meet the requirement for additional support resources to efficiently address issues raised by a much larger number of users. A more robust training and support infrastructure, together with in-app localization, are also key prerequisites for cross-country intervention scaling.

Feedback

As mentioned in the Introduction, the goals of this Guidebook are to improve overall smallholder farmer digital solution quality, encourage meaningful best practices discussion and stimulate new partnerships. We would love your feedback on the existing content and your ideas for partnerships and joint innovation.

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