

# Designing Gender-Inclusive Digital Solutions for Agricultural Development

An introductory guide and toolkit

Alliance



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Platform



The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) delivers research-based solutions that harness agricultural biodiversity and sustainably transform food systems to improve people's lives. Alliance solutions address the global crises of malnutrition, climate change, biodiversity loss, and environmental degradation. With novel partnerships, the Alliance generates evidence and mainstreams innovations to transform food systems and landscapes so that they sustain the planet, drive prosperity, and nourish people in a climate crisis. The Alliance is part of CGIAR, a global research partnership for a food-secure future.

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# Designing Gender-Inclusive Digital Solutions for Agricultural Development

**An introductory guide and toolkit**

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February 2022


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# 1

## Introduction

**Digital tools play an increasingly important role in agricultural research for development. Often, they fall short in fulfilling their promises for women or other marginalized groups. Adoption across these groups is often low. One key reason for this is a narrow and techno-centric perspective on digital tool design. Design thinking brings a change in perspective on digital innovations towards more inclusive design processes.**

Many tools are designed with little to no attention to the diversity of users' needs, or the differences in use context. Moreover 'inclusiveness' is often omitted as a requirement in the design process for these tools. Women and youth can find it particularly difficult to engage with and benefit from mobile and digital tools as these are often designed with a stereotype user in mind, which is often a white adult man (GSMA, 2021, Polar, 2017). Women and young people tend to have less access to assets (phone access and ownership) than men. Data and digital literacy skills tend to be lower, and social norms around use of digital tools might discourage women from engaging for example speaking to men on the phone, and affecting their ownership of and control over mobile phones. Developing new digital tools and services with a 'designerly' mentality can help. **By applying human-centered, participatory design methods, researchers can better understand and cater for the diversity of users' needs and develop more gender-inclusive, effectively and widely scalable digital tools and services.** Involving beneficiaries and future users in the solution-finding process also creates a sense of empowerment and ownership.

This practical guide and toolkit for gender-inclusive digital design is directed at people in CGIAR working in digital agriculture who are interested in creating gender-inclusive, sustainable solutions. **This guide aims to 1) introduce the concepts of design thinking and inclusive design, 2) describe the design process and provide relevant tools for the different steps of the process, and 3) provide links for further readings to deepen the understanding on this topic.**

We hope this guide motivates and enables more colleagues to apply designerly approaches for developing more inclusive digital tools.

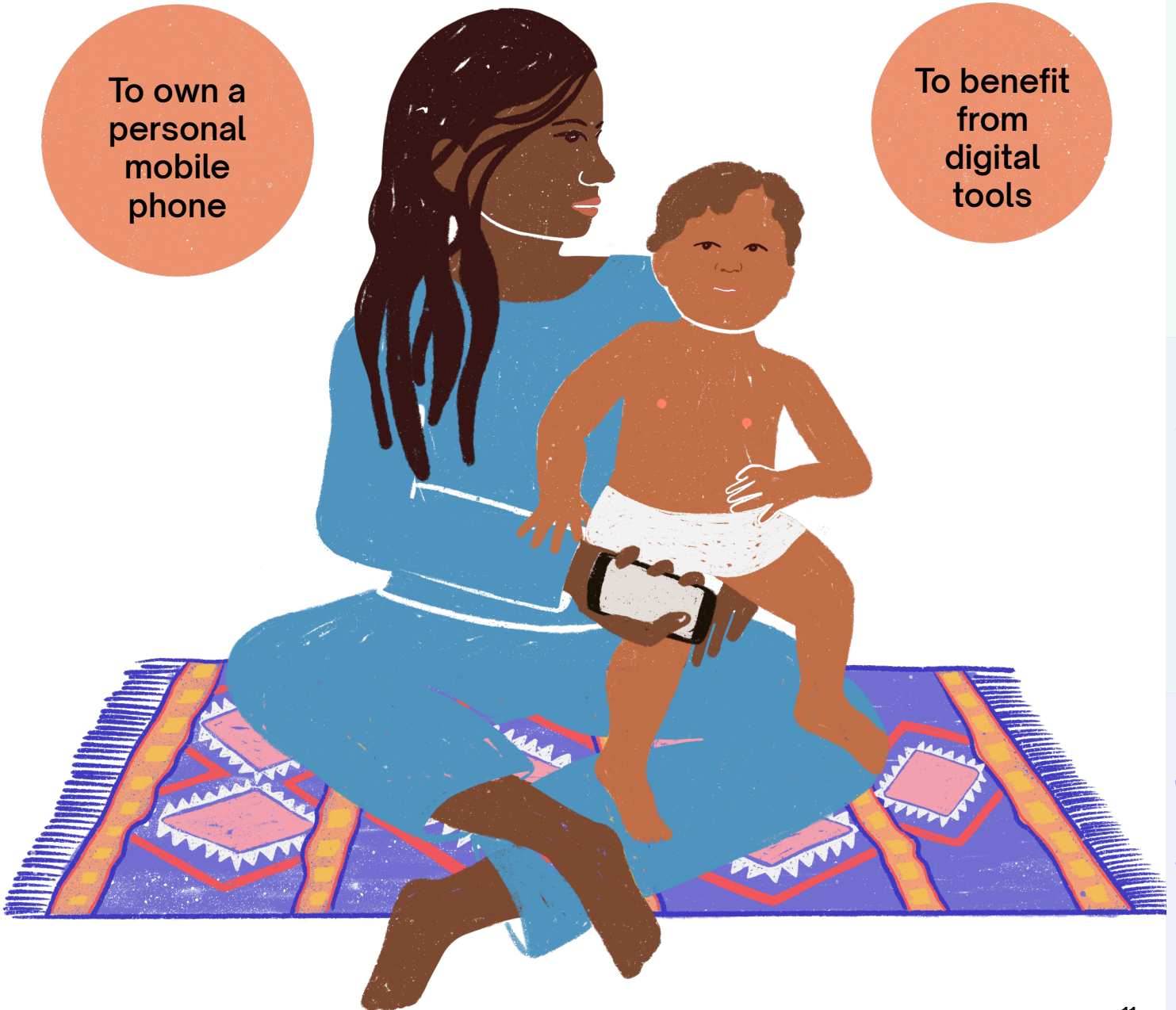
# Women are less likely...

To spend money on mobile  
airtime

To have time to consume and process new information

To own a personal mobile phone

To benefit from digital tools







# 2

Designerly  
approaches for  
gender inclusion  
in digital  
development

**Designerly approaches are the way forward to achieve digital inclusion and sustainable adoption of digital tools in small-scale agriculture. This chapter presents the relevant design concepts to create the necessary conceptual understanding.**

## Design Thinking

is a mindset and a general approach to creative problem solving not restricted to digital solutions (Elmansy, 2019). In Design Thinking, humans are put at the center of the process. Empathizing and understanding people, their context and the root causes of the problem, are essential for a good design process. Design Thinking can be applied to solve problems as diverse as managing bus-stop queues, deforestation control, or play-ground design. Design Thinking is an iterative process. The main stages of the process are **a) understanding the context and the problem from a user perspective (define), b) ideate a solution, and c) prototype and test (see Figure 1).**

## User-Centered Design (UCD)

evolved in the field of Human-Computer-Interaction, when the first hard- and software interfaces were designed for everyday users. UCD puts the needs, abilities and preferences of the user at the center of the digital design process, in contrast to, for example, more technology-driven design processes (Elmansy, 2019). **Human-centered Design (HCD)** is regarded more universal than UCD by considering direct users along with all humans affected by or interested in a specific solution (stakeholders). This is especially relevant when designing for female farmers, where the perception and attitudes of others (spouse, community) might influence how female farmers are able to use a tool. UCD and HCD are broadly the same in conceptualization, process, and method. HCD has received broader attention in the development community with the introduction of the three-stage methodology by IDEO (Inspiration, Ideation, Implementation; IDEO, 2015).

## Inclusive Design

is a design approach that actively seeks to promote social inclusion through design. The approach requires designers to consider the diversity of experiences that may exclude a person from using a product or service (Holmes, 2018). Inclusive Design assumes that exclusion is the result of a mismatch between a solution and a person's needs and abilities.

**Guiding principles for Inclusive Design are: a) recognize exclusion, b) learn from diversity, and c) solve for one and extend to many (Holmes, 2018).** Inclusion is not as such an objective of Human-Centered Design. In fact, many solutions developed following a Design Thinking or HCD approach are designed to reach as many people as possible and thus design is oriented towards an "average user". In practice, however, this can lead to marginalization and exclusion of "non-average" users, such as illiterate women.

Inclusive design is a particularly interesting approach for developing solutions serving a specific group of people facing difficulties accessing and using digital tools linked to their gender, age, education or other factors.

**A good example for inclusive design in the digital world is the subtitle option for Instagram videos.** This option was designed with a very specific user group in mind: hearing-impaired persons. It turned out however that many more not permanently hearing-impaired people are interested in accessing digital contents through subtitles. We can think about people without access to headphones in an environment where they cannot listen to content due to (loud noise or not wanting to disturb others) or people who listen to content in a foreign language who need subtitles to better understand.

**IDEO field guide: A step-by-step guide that will get you solving problems like a designer.**  
→ <https://www.designkit.org/resources/1>

**The inclusive design guide:**  
→ <https://guide.inclusivedesign.ca/index.html>

# The Design Thinking Process

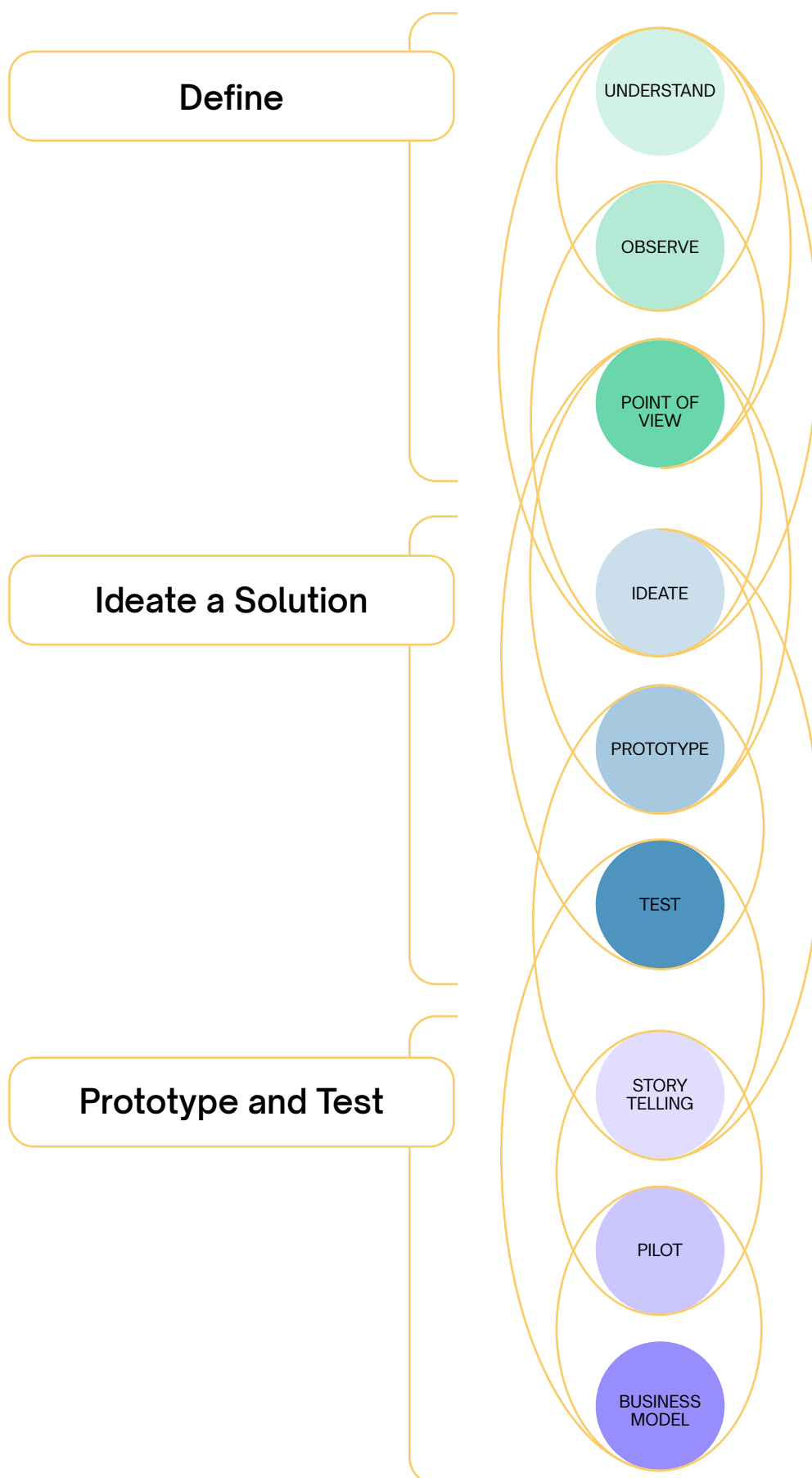


Figure 1: Design Thinking

→ <https://www.interaction-design.org/literature/article/design-thinking-a-quick-overview>



# 3

Why (inclusive)  
design in ICT4Ag?

**Digital tools and services have great potential for addressing gender inequity in small-scale agriculture. They offer innovative ways of communicating and providing information to increase and wellbeing and to mitigate climate change. However, despite a strong increase in digital services for agriculture in recent years, the digital divide between women and men persists. We outline why and explain how designerly approaches can help to close the digital divide.**

In many places, women are less likely to own a personal mobile phone, be literate, spend money on mobile airtime, or even have time to consume and process new information. This means that many existing information and communication technologies for agriculture (ICT4Ag) services, by disproportionately benefitting men, risk increasing gender disparities in access to agricultural information. Research has found that many ICT4Ag solutions have a higher number of male users than females. For example in India, a recent report showed that for a specific agro-advisory service only 13% of the users were women (GSMA, 2021).

The design of digital services can influence who is able and motivated to use and benefit from them. **To date, many digital tools are “gender blind” by design. This means they do not consider the specific challenges female farmers face in accessing mobile or digital contents.** For example, information services may prioritize value chains dominated by men over women’s domains in agriculture, or messages are sent at times when women are most busy with household chores. Also, they may require carrying a mobile phone to the farm, while many women use family members’ phones only at the homestead. Digital tools might even create more exclusive structures if gender-diverse needs are not addressed properly in the design. It is important to understand which options are inclusive in which context. By only providing a voice-based advisory tool (“see also” on next page), women might not be able to equitably and adequately access and use extension advice. Social norms might have influenced their engagement with an often male-dominated advisory service. If the voices of the service are male,

women may have real negative consequences in using the service: spouses might mistrust the women, or she might risk a bad reputation in the community by talking to non-family men.

Risk attitudes can differ between male and female farmers. This influences women’s learning style and decision to use a new digital tool. Many digital tool designs are based on the assumption that users will learn the features through playful experimentation and learning-by-doing. But research shows that women are less likely to explore new tools through playful exploration due to a higher risk aversion (Stumpf et al, 2020). These often unconscious design decisions based on assumptions about the learning style of users might heavily influence how women users engage with a tool.

**Digital design methods can help to create solutions that overcome such gendered exclusion. To generate a positive impact of digital services and products on living conditions in rural areas, the tools need to be fit-for-purpose and the result of an inclusive, gender-aware design process.**

Applying an inclusive design approach to digital development adds value to projects. The iterative character allows for rapid and agile adjustment of the solution or product during the development process. This reduces the risk of costly corrections to design failures after product launch and during implementation. Being closer to users’ needs helps to create fit-for-purpose solutions and increases adoption. Applying inclusive design can have a positive impact on project performance indicators (e.g. number of users), especially for gender and inclusion metrics (e.g. share of female users).

## SEE ALSO

### The digital divide — a definition

The digital divide describes the gap between “information poor” and “information rich” people.

#### 1ST LEVEL OF THE DIGITAL DIVIDE:

unequal physical access to ICT\*, mobile devices and the Internet mainly due to lack of adequate infrastructure (e.g. urban-rural divide)

#### 2ND LEVEL OF THE DIGITAL DIVIDE:

unequal access to and use of ICT and devices due to socio-economic, political, cultural or educational factors (e.g. gender divide)

#### 3RD LEVEL OF THE DIGITAL DIVIDE:

unequal capacities to benefit from and capitalize on the access and use of digital tools (e.g. low digital literacy level decreases positive impact of digital tools with same access opportunities than man)

#### FURTHER READINGS:

Ragnedda, M. and Gladkova, A. (2020): Understanding Digital Inequalities in the Global South.

→ [https://link.springer.com/chapter/10.1007%2F978-3-030-32706-4\\_2](https://link.springer.com/chapter/10.1007%2F978-3-030-32706-4_2)

USAID Gender digital divide toolkit

→ <https://www.marketlinks.org/weege-wiki/gender-digital-divide>

## SEE ALSO

### Voice-based solutions

Voice-based solutions refer to any system where users can engage through the use of their voice. This includes voice messages, live hotlines or interactive voice response (IVR) systems. IVR-based systems allow users to engage with a computer-operated system through the use of voice and inputs via the keypad. IVR systems are typically used in settings where high call volumes have to be handled such as in customer service hotlines. Voice-based systems gain attraction in ICT4Ag as they are accessible to people with low levels of literacy and with a basic feature phone.

#### EXAMPLES IN DIGITAL EXTENSION:

Ushauri:

→ <https://www.biodiversityinternational.org/news/detail/ushauri-agricultural-advice-is-just-a-phone-call-away/>

Dione et al. (2021)

→ <https://www.frontiersin.org/articles/10.3389/fvets.2021.611263/full>

**\*ICT:** Information and Communication Technologies. Refers to any technological system, software or hardware, that helps in collecting, storing, aggregating, analyzing, or communicating data and information. Relevant examples for agriculture include mobile phones, websites, apps, or SMS.







# 4

Before starting the  
design process

**Inclusive digital solutions acknowledge the diversity of users and their ways of engaging with digital tools. When you want to engage in design for inclusion, you need a diverse design team that shares a common understanding of gender, inclusion and design for inclusion.**

# 1

## Team Composition

The first step in an inclusive design process is to reflect on who to include in your design team: an inclusive solution that considers diversity requires a diverse design team. During the design process, it is important not only to involve field staff, but also digital developers and programmers. This will help to identify gaps in knowledge and capacities, but also reveal possible biases and stereotypes that might guide design decisions.

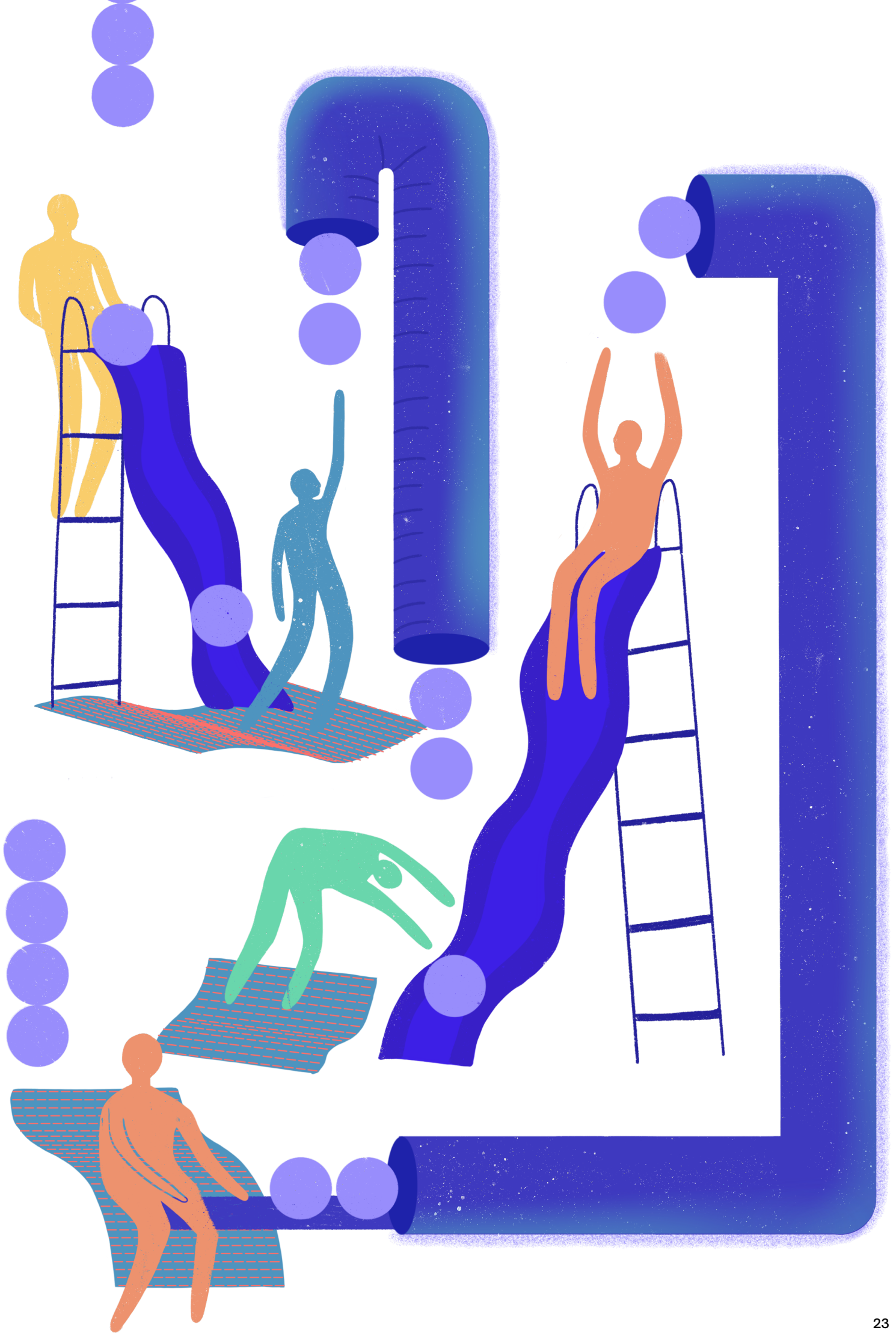
Decide carefully on who will be part of the design team: include a digital developer, a gender expert, a subject matter expert, and if possible, include persons from the community you are designing for, considering gender and other minority voices in the composition of the team. Design is an iterative process, so you might encounter new experts that could contribute to the solution-finding process along the way. Be aware of potential bias towards selecting team members with whom you are used to work and feel closer, and remember that the goal is to have a diverse team.

# 2

## A common design language

Create a common understanding on design and inclusion: before you start designing, bring all team members and partners at one table and discuss:

- 1.** The design cycle, its different steps and specific terms, such as “prototype”, so everyone has an overview and is on the same page. It is also crucial to establish an open and collaborative atmosphere where everyone feels comfortable to share their thoughts. Design is about coming up with creative ideas - therefore there is no such a thing as a bad idea.
- 2.** Gender, diversity and inclusion, to reach a shared understanding of these terms and concepts. This will help to avoid misunderstandings and to have clear goals in terms of who we want to include and how we want to report on the process. The team should also have developed a common understanding on what inclusive design is and what they want to achieve in terms of inclusion. For example, the result of the process might be a tool or service that is not universally accepted but rather only focuses on specific preferences of female farmers.





# 5

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## Inclusive and human-centered design – the process

# Steps of the Design Cycle

The iterative Human-Centered and inclusive design process is divided in four main steps that move from problem understanding and context analysis, to ideation, testing and piloting, implementation and scaling (see Figure 2).

The steps of the design cycle are the following:

- 1. OBSERVATION:** Develop a good understanding of the problem and its root causes, along with the users' context, constraints, wishes and needs.
- 2. IDEATION:** Come up with ideas that could solve the problem
  - a. GENERATING IDEAS:** brainstorm about which potential solutions could solve the problem and select the most appropriate ones.
  - b. PROTOTYPING:** create simple models of the selected ideas.
- 3. TESTING AND PILOTING:** The ideas are tested by users hands-on.
  - a. PROTOTYPE TESTING:** Users evaluate different prototypes, and based on their feedback the most promising one is refined and brought to the next step.
  - b. PILOTING:** The prototype is transferred into a functional (digital) solution and this beta-version is tested with users in real life context, collecting constant feedback.
- 4. IMPLEMENTATION AND SCALING:** After improvements based on the pilot phase are implemented, the solution is ready for further scaling, bringing it to more users.

For each design step, this section provides:

- 1. MAIN OBJECTIVES**
- 2. GUIDING QUESTIONS**
- 3. HELPFUL TOOLS AND METHODS**

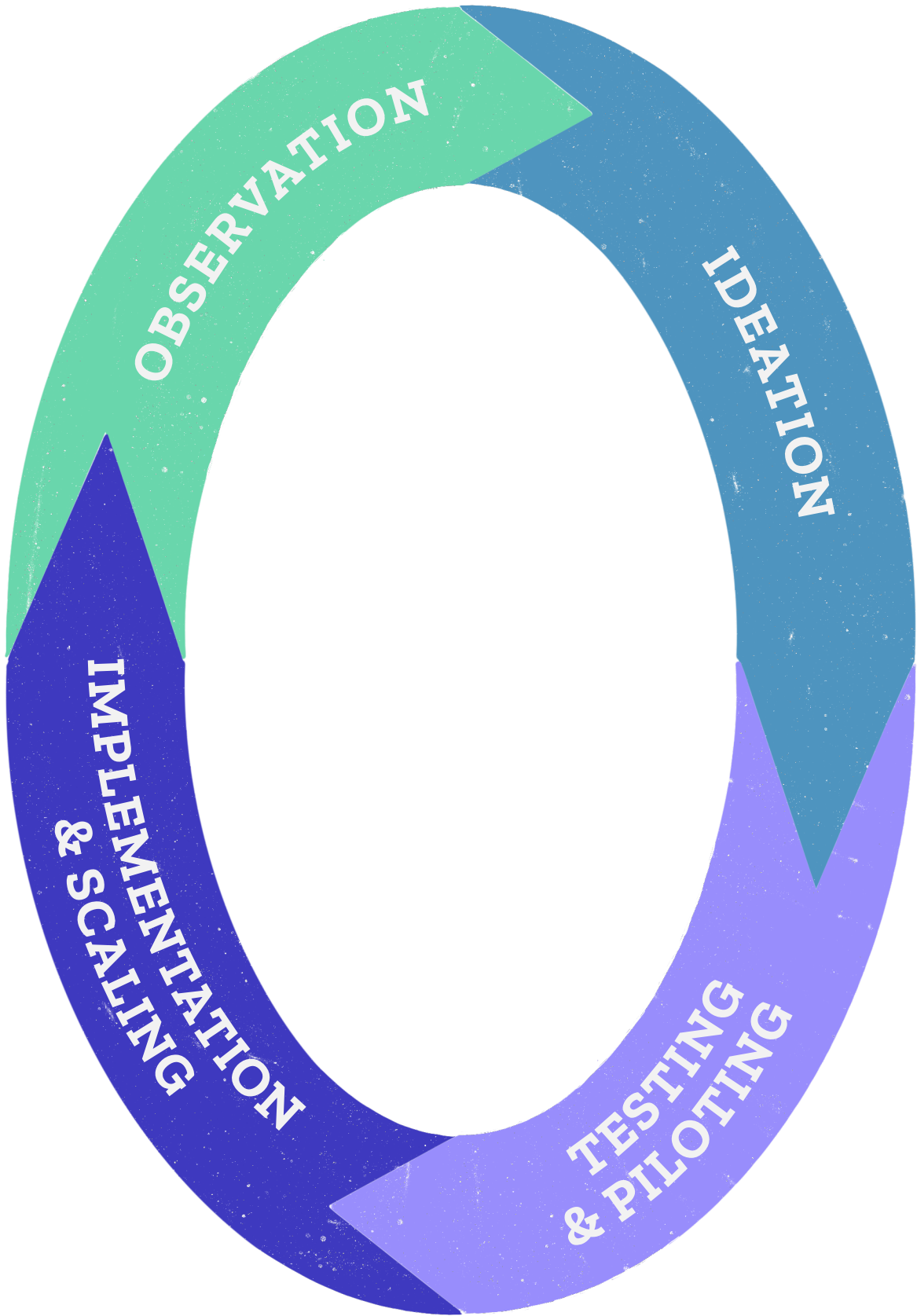
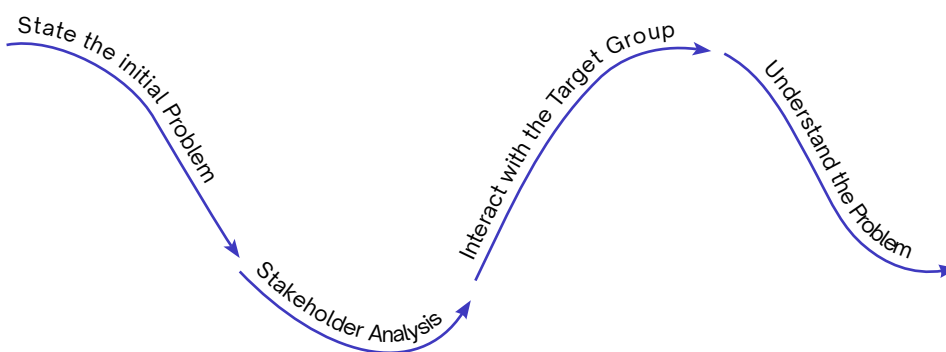


Figure 2. Major steps in the human-centered design cycle



# Step 1: Observation

The goal of this step is to develop a thorough understanding of the problem and its root causes, as well as the users' context, constraints and needs. At this stage, it is vital to observe female farmers' lived experiences with digital and non-digital agricultural services. Empathizing with the target group and immersing yourself in their situation will enable you to recognize exclusion and avoid design decisions that replicate or worsen gender-based exclusion.



Many ethnographic, qualitative and quantitative tools can be used at this stage. We will highlight the key aspects and selected tools that we found helpful in our design experiences. Remember that design is an iterative process, so even at later stages of the design process you may find it useful to do some observation and context analysis and test some of the tools.

1. Start the context analysis with the **initial problem** statement (e.g. “women have lower agricultural production than men”) and your **working hypothesis** (e.g. “the main constraint to women’s participation lies in the unequal access to information and agricultural advisory services”).
2. Conduct a **stakeholder analysis** to know who you should talk to to get a good understanding of the root causes of the problem situation.
3. Identify **gender-specific aspects of the problem situation**. This is important because not all digital exclusion problems can be tackled through digital solutions alone. For example,

if the content provided through a voice-based digital advisory system is oriented to male-dominated production systems, it will most likely have a weaker impact on female farmers’ productivity. The service and information provider, e.g. the public extension system, needs to be aware of the differentiated information needs and channel preferences of different farmer groups, which will also include some effort in terms of gender-awareness work.

4. At the beginning, **understanding the problem** is what matters most. Here are a selection of methods that can help gather rich and diverse information to understand the problem.

— **PARTICIPANT OBSERVATION** is a powerful tool at this stage. You can observe users in their context and daily (agricultural) routines. You can also pay attention to how the users perform specific tasks with a mobile device, such as making calls, recharging airtime, charging the battery etc. To get an understanding of their



mobile and digital skills. You can gain a deeper understanding of the lived reality of a female farmer, and see for example when she has time to use the phone, in which environment she typically uses the phone (alone or with a lot of noise in the background), how the community perceives when the women uses the phone, how women use information in their decision-making, just to mention a few. Participant observation is time-intensive and should involve staff with experience in qualitative and ethnographic methods, cultural awareness and, especially, social skills and empathy.

— **STRUCTURED SURVEYS** help to understand digital literacy levels, socio-economics, aspects of access to phone and digital tools and female preferences for different contents and delivery mechanisms. We found it helpful to apply the Rural Household Multiple Indicator Survey (RHoMIS, Hammond et al. 2016), or to apply the (5Q approach Eitzinger et al. 2021); a module to understand digital preferences by gender is in preparation). There are also specific gender related survey tools, such as the women’s empowerment in agriculture index (WEAI, Alkire et al. 2013) to measure female empowerment, but with no options so far to look at digital access and use.

— **FOCUS GROUP** discussions with few individuals can reveal very interesting insights, because participants may get inspired to think further when discussing with others. However, active participation in a focus group discussion can be unequal. Especially women in mixed groups might be hesitant to express their feelings and experiences. You may want to consider women-only focus groups, or groups where all members trust each other.

— **UNSTRUCTURED INTERVIEWS** with individuals, in which a general topic is further explored, can reveal further insights. In an atmosphere of mutual trust with the interviewer(s), individuals may raise concerns or voice ideas that would otherwise be suppressed by social norms in group settings.

**Make sure that the results of the context analysis are shared and discussed by the whole team. It is important to share a joint understanding of the user context.**

## SEE ALSO

### Good practices

- Make sure your field work team is diverse and balanced in terms of gender. During field work this will greatly influence the richness and lack of bias of the information that you are gathering.
- During the exploration phase, ideally, someone from the community (or close to it) should support you.
- Social rules and norms in the community might restrict women from talking to strangers, especially males. You might need clearance from a community council if you want to do your research in a community and you need to clarify which questions are appropriate to ask.

### Recognize your own biases

One of the most common biases is the ‘ability bias’ - the tendency to solve problems using one’s own abilities as a baseline (Holmes, 2018). Recognizing ability bias can help digital designers to avoid exclusion traps. Imagine you were from the 19th century and knew nothing about digital media – now let your target group show you how they use digital tools and services, which functionalities they know, and what difficulties they experience.

## Explore your expected user group

### Community level:

- ✓ Which cultural and social norms influence community members, specially female members, in the current problem space?
- ✓ Who is particularly affected by the current problem?  
(the initial problem statement)
- ✓ What are the power dynamics, and who might currently benefit from the existing problem?

### Household level:

- ✓ What are the major agricultural routines?
- ✓ How are household responsibilities shared?
- ✓ Who takes decisions on farming, expenditures, or communication?

### User level:

- ✓ What are the levels of digital literacy?
- ✓ Which digital media and services are being used?
- ✓ Do users have access to associated resources  
(airtime, electricity, support...)?
- ✓ How do they interact with digital tools and how to they feel about these?
- ✓ Are there daily routines in the use of phones or other digital media?
- ✓ What types of delivery channels are preferred  
(video, voice message, answers to explicit questions...)?
- ✓ What contents are users most interested in?

## Example



Photo credit: Action Against Hunger / Luis Melgar

## For context analysis, combine focus group discussion and individual interviews to understand gender dynamics

To support context analysis for the design of a food monitoring system in Guatemala, we wanted to understand how women express their opinion and share their experiences in community groups.

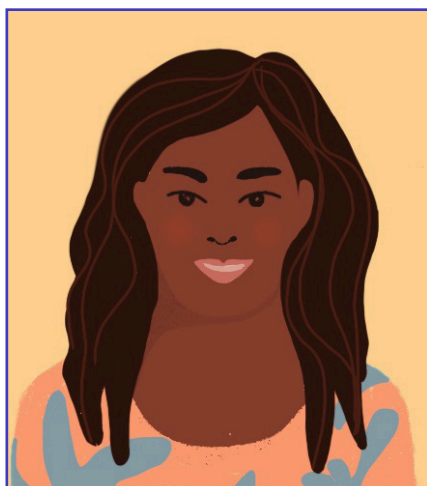
We asked a local gender expert to participate in community group meetings and to talk individually to the female members of the group. Participatory observation revealed that during the group meetings always the male person was leading the opinions expressed in the group, while the individual interviews with the women revealed that they were not feeling confident to express their opinion in public or sharing an opinion that was not in line with what the male “thought leader” was stating.

This experience reveals the importance of thinking carefully about the adequate setting and method mix for context analysis.

## Example

### Personas and user journey for context analysis

In Ethiopia, we supported the design of a seed platform to manage seed stock and distribution. The seed sector in Ethiopia is highly complex, with several stakeholders involved. To better understand it, during the context exploration phase, we combined two tools: personas and user journey. We created 11 different personas, each one of them representing a specific stakeholder group involved in the seed sector in Ethiopia. Personas were developed in workshops with key partners considering their gender, age, education, professional background and other socio-economic characteristics (Figure 3). We also elaborated the user journey map representing the main stages involved in seed purchase (columns in table 1). In groups, future users assumed the perspective of one ‘persona’. They had to imagine their persona’s subjective interactions (row names in table 1) for each step of the journey. This information helped us to map the whole experience and understand challenges of the current seed system.



**Deborah, 28**

AGRICULTURAL  
EXTENSIONIST

**ABOUT HER JOB:** She works as an extension agent, and serves a peasant association and five producers cooperatives. Also, together with another extension agent she serves 1500 households distributed in 5 villages. One of her tasks is to collect information on seed demand for the next season from farmers, and pass it over to her supervisors in the Ministry of Agriculture.

**MAIN CONSTRAINS:** She has a lot of administrative work to do and limited access to transport services to reach the field and visit farmers.

**DIGITAL TOOLS:** She has a basic phone and no computer.

Figure 3: Persona representing a female development agent (agricultural extensionist).

**Table 1: Five main stages of the customer journey map for seed purchase (first row) and requested information to participants (first column)**

	OBTAIN INFORMATION	MANAGE INFORMATION	MAKE DECISIONS	OBTAIN SEED	USE SEED
ACTIONS		She puts together the data collected from farmers, other development agents and supervisors. No data interpretation, she just sends it to her supervisors			
COMMUNICATION CHANNELS		Paper, phone, calculator, pen and carbon copy. Contact and collaboration with her colleagues through reports, requisitions and meetings			
HAPPY MOMENTS		Capacity building events for her, and when farmers are satisfied with what they get when production enhanced			
PAIN POINTS		No computer, and no skills to operate excel, which pushes her to using traditional ways of information collection			
OPPORTUNITIES		Training for development agents and other experts, presence of digital tools to help them collect information			

## Tools & Methods

### Observation

#### Participant observation

It is a deep dive into a community or group to gain a better understanding about their lives, causes for frustration and satisfaction. The objective is to understand root causes of problems, and get a better idea about which solutions would work.

##### PEERS OBSERVING PEERS

→ <https://www.designkit.org/methods/peers-observing-peers>

##### PARTICIPANT OBSERVATION

→ <https://www.qualitative-research.net/index.php/fqs/article/view/466/996>

#### User journey

It visualizes how a user interacts with a product or service. It is represented as a timeline of all the contact points between the user and the service, including the actions, channels, and happy or uncomfortable moments for the user during the interaction with the service or product. User journey as a tool can be applied in any step of the design cycle.

##### HOW TO USE JOURNEY MAPS

→ <https://apolitical.co/solution-articles/en/journey-map-human-centred-design>

→ <https://www.ideo.com/blogs/inspiration/use-customer-journey-maps-to-uncover-innovation-opportunities>

#### Personas

Fictional characters and behavioral models that represent characteristics, needs, goals and motivations of real users. It is a tool that helps the team to be empathic and keep focused on the users. Personas should not represent the “average” but the diversity of users.

##### PERSONAS

→ <https://servicedesigntools.org/tools/personas>

##### WHY AND HOW PERSONAS?

→ <https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them>

# Observation

## Survey

There are several modular surveys such as RHoMIS and Women's Empowerment in Agriculture Index (WEIA) that will give you a deep understanding of the individuals you are working with. There are also formats that allow you to gather the information you need in a cost-effective manner, such as 5Q.

### RHOMIS

→ <https://www.rhomis.org/>

### 5Q

→ <https://alliancebioiversityciat.org/publications-data/monitor-climate-smart-agricultural-interventions-real-time-participatory-tool>

### WEAI

→ <https://www.ifpri.org/project/weai>

## Focus group

This can help you to gather a quick understanding of the community's life, dynamics and needs.

### GROUP INTERVIEW

→ <https://www.designkit.org/methods/group-interview>

### REINVENTING THE FOCUS GROUP

→ <https://www.ideo.com/blog/need-feedback-heres-5-ways-to-reinvent-the-focus-group>

## Open interviews

Talking directly with individuals and having a natural flowing conversation with them is the best way of getting to know their hopes, desires and aspirations.

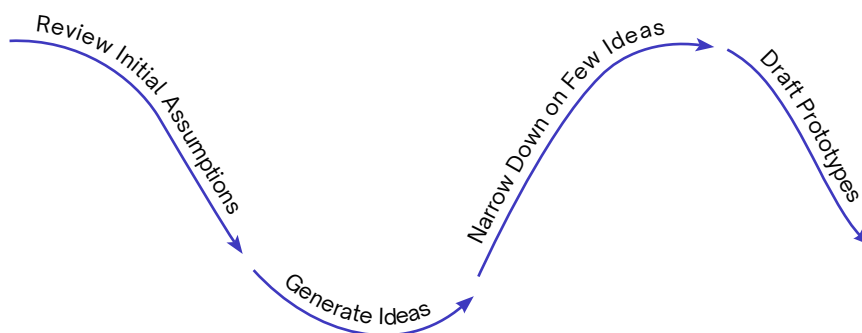
### INTERVIEW

→ <https://www.designkit.org/methods/2>



# Step 2: Ideation

The goal of this step is to brainstorm and play around with ideas that could help to solve the problem. Ideation is an open process; every idea counts and can be discussed. The most promising ones will be further developed.



## Generating Ideas

During context analysis, the design team has understood the main problem female farmers face and its root causes. Next, the design cycle moves to generating potential solutions or ideas to address these problems. This step is taken by the whole design team through participatory activities. The aim is to first generate as many ideas as possible, and then narrow them down to the few that best suit the identified problem(s) and the context in which the ideas should work.

**1. REVIEW YOUR INITIAL ASSUMPTIONS**, and re-define, if necessary, the problem that female farmers face.

**a.** For this step it is key to **avoid your own assumptions, and empathize with the female farmers**. Useful tools that can help you with this are personas, use-cases, or mind maps.

**b.** A good way of defining specific needs and insights from the female farmer perspective is to **break potential solutions down** in a very simple way “*user xx needs a solution for \_\_\_ because \_\_\_*” – make sure to discuss these with your target group.

**2. IMAGINE WHICH POTENTIAL SOLUTIONS (OR IDEAS) COULD ADDRESS THE PROBLEM.**

Here the whole team should share their thoughts. Any idea can be relevant to the problem. For this step, **quantity over quality is the priority!**

**3. DISCARD THE IDEAS THAT DO NOT FIT THE PROBLEM AND CONTEXT WELL.**

This is done jointly by the entire team, once everyone’s thoughts have been collected. In the next page, under “Explore your expected user group” you can find some guiding questions that can help in this process.



	<b>Explore your expected user group</b>
✓	Which ideas best address the identified constraints that users face?
✓	What are their (possible) limitations?
✓	Which ideas require building a completely new solution, which ones can capitalize on what is already existing?
✓	Which ideas require least learning effort by users?
✓	Which ideas might create exclusion (e.g. by requiring literacy, or expenditures on airtime)?
✓	Which ideas are scalable beyond the immediate design context?

## SEE ALSO

### Pay attention to gendered exclusion!

#### THE DIVERSITY OF USERS IS CRUCIAL

Every member of the design team should bring in their unique perspective. When narrowing down on a few ideas, the design team needs to ensure that internal minority views are not suppressed.

#### AN 'INCLUSIVITY VETO' CAN HELP

The team may decide to either pursue or discard any idea based on feasibility, costs, expected impact, and so forth. Inclusivity aspects, however, remain the ultimate threshold: if any member of the diverse team votes in favor of a discarded idea, or against an idea originally considered, this veto counts – provided it is on grounds of inclusivity aspects.

## Drafting Prototypes

Once you have selected a few ideas you think can address the problem, it is time to bring them to life! In this phase the goal is to create simple, tangible “mock-ups” based on the ideas generated in the previous phase. This is called ‘prototyping’ and the quickly built models of your ideas are prototypes. The goal is to visualize ideas and afterwards get feedback from real users. There are different ways of representing the ideas or solutions. For example:

### LOW FIDELITY PAPER PROTOTYPES

When designing an app or a web portal, paper prototypes help to represent versions of the interface (for example sketches of each screen). It is a way of iterating rapidly because **it does not require hours of programming, it is inexpensive and increases the involvement of the whole team because everyone can do it.** However, the feedback gathered is less accurate because it requires a certain level of imagination. Alternatively, there are online tools that allow you to create digital prototypes.

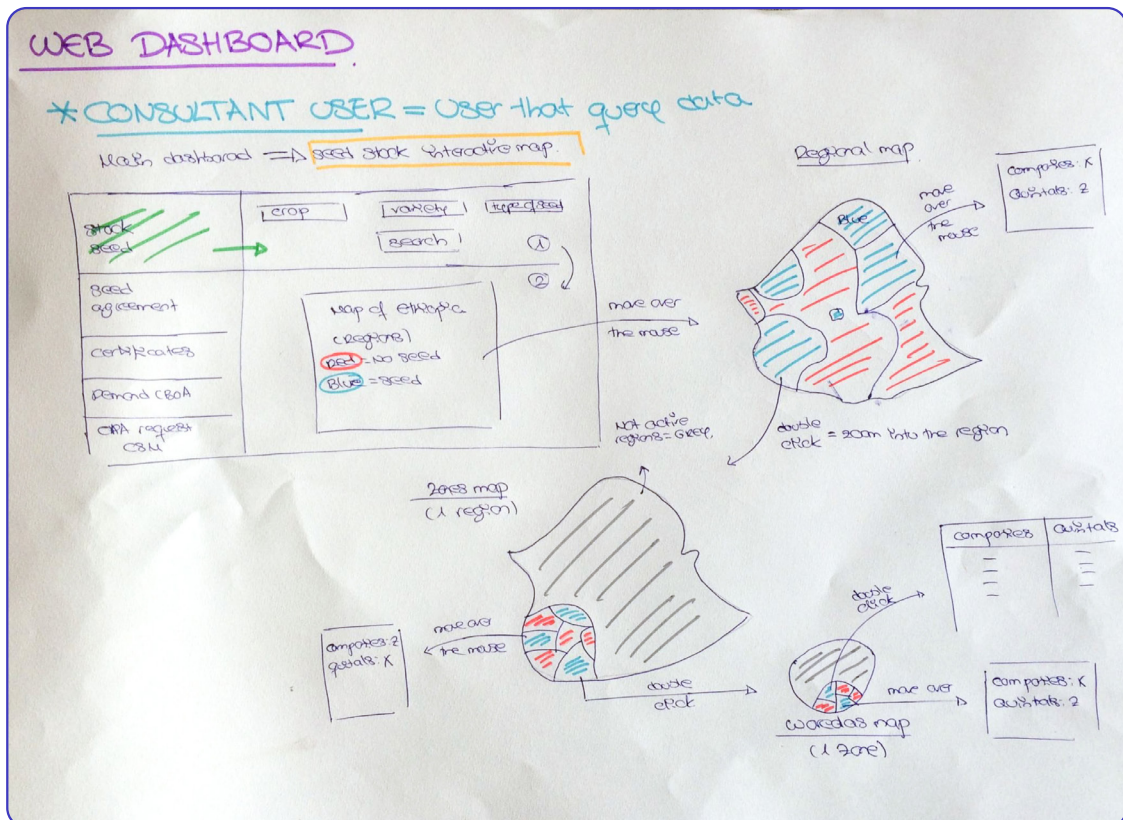


Figure 4: Paper prototype for an online platform about seed inventories in Ethiopia

## STORYBOARD

It represents a sequence of events using drawings, pictures or collages. **It aims to represent how a user might be interacting with the product or solution, helping to visualize your concept from start to end.** This type of prototyping helps the team to understand better the different contexts of use of the solution.

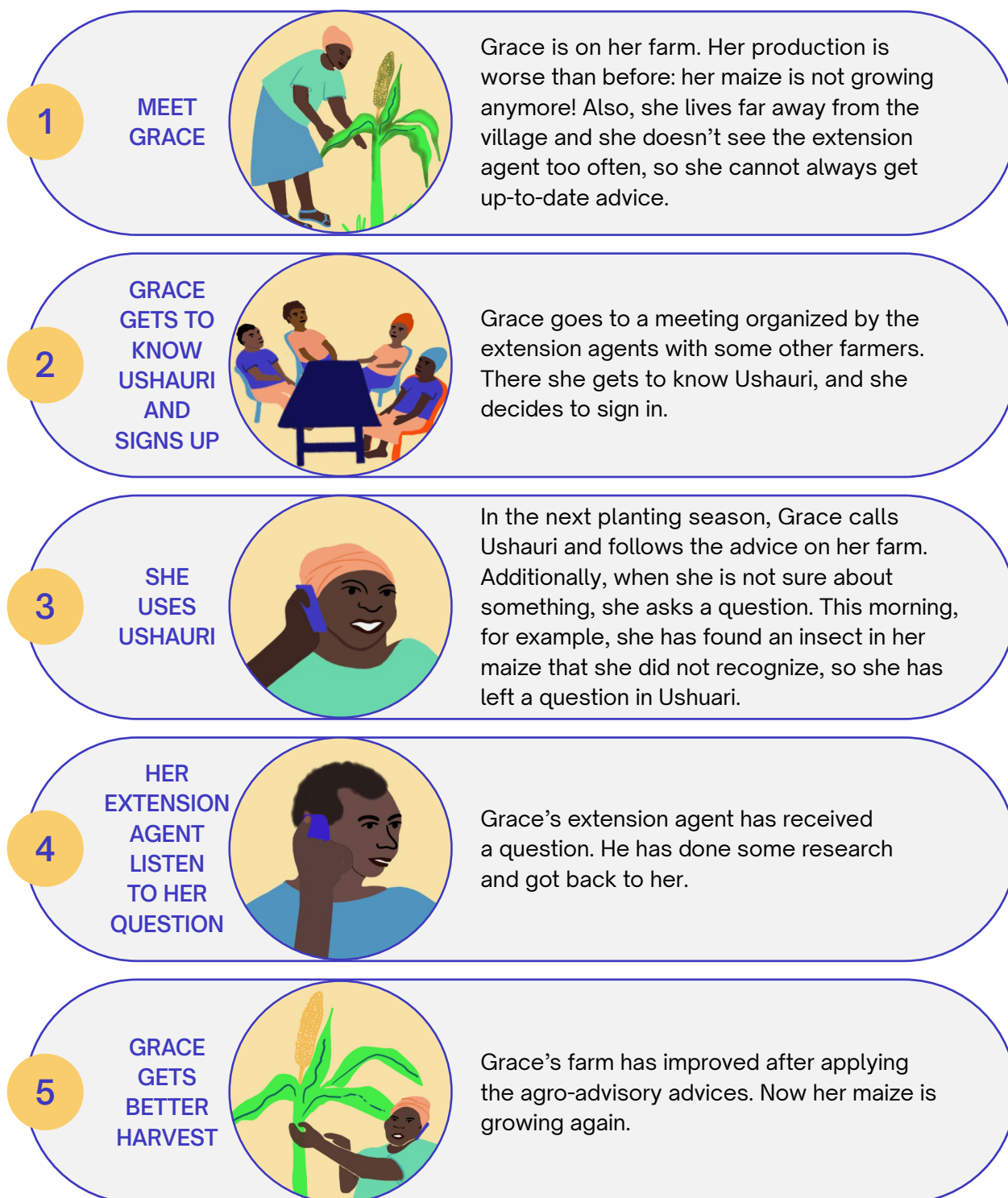


Figure 5: Storyboard created for Ushauri (Kenya and Tanzania).



### ROLE-PLAYING

**It can be used to test solutions that are not based on graphical interfaces, such as a mobile hotline.** It can help to identify, for example, how many options the hotline menu should give. A designer ‘runs’ the hotline menu, and a user interacts with it and provides answers.



Photo credit: Bioversity International / Jeske van der Gevel

## Example

### Design choices for low literacy

For people with low literacy some design choices that could make the solution more inclusive include using icons instead of text; allowing for voice instead of text input from the user; accompanying text information with voice narration; and having linear navigation (instead of hierarchical), in which the different steps on an app or webpage are sequential (Veinot, 2018).



Photo credit: Bioversity International / Jeske van der Gevel

## SEE ALSO

### Tips for prototyping

**CREATE PROTOTYPES EASY TO UNDERSTAND AND EASY TO CHANGE** The goal is to be able to change them on the fly, while you are testing them with the farmers. This is very easy to do using, for example, paper prototypes or role playing.

**KEEP DIVERSITY IN MIND!** It is crucial to use a simple language, and when possible, replace language with non-verbal communication (symbols, drawings etc.), so a wide range of users can have access to the solution, independent of language, literacy etc.

## Tools & Methods

### Generating ideas

#### Use Cases

It describes scenarios in which a user may encounter and use a product or service. In inclusive design it is crucial to include edge or unusual cases. This means including 1) users with needs that are not typically considered and 2) non-typical or unexpected uses from the service.

→ <https://guide.inclusivedesign.ca/tools/usecases>

#### Mind Maps

It helps to organize the information to reveal interconnections and set the structure of the argument. A way of creating them is to start with the initial concept or topic, list all the sub-topics, and start to connect the listed items.

→ <https://www.toptal.com/designers/digital-product-design/what-is-a-mind-map>

#### Workflows And Diagrams

Online tool that allows users to easily create charts and diagrams.

→ <https://docs.google.com/drawings/>

# Drafting Prototypes

## Paper Prototypes

The simplest way of creating them is just with pen and paper. Alternatively, it is possible to create them in digital interfaces, either using PowerPoint or more advanced and specific apps for prototyping, that mimic, for example, the interface of a mobile phone app.

### PAPER PROTOTYPING, THE 10 MINUTES GUIDE

→ <https://www.uxpin.com/studio/blog/paper-prototyping-the-practical-beginners-guide/>

### MARVEL APP FOR PROTOTYPING

→ <https://marvelapp.com/>

## Storyboarding

It can be created simply drawing, using pen and paper or using a digital tool. There are a lot of imaginative ways to go for it: you can create a comic, or you can do a collage.

### PROTOTYPING YOUR SERVICE WITH STORYBOARD

→ <https://peerinsight.com/blog/prototyping-with-storyboards/>

## Role-playing

This method is like a theater play, and just requires some previous thinking about which elements you would like to prototype and a room with participants.

### PROTOTYPING VOICE APPS THROUGH ROLEPLAY

→ <https://www.theguardian.com/info/2018/nov/29/prototyping-voice-apps-through-roleplay>

## Low Code

It is a software development approach that requires little or no coding to overcome problems related to heavy coding dependent solutions (costs, time, inflexibility, lock-in)

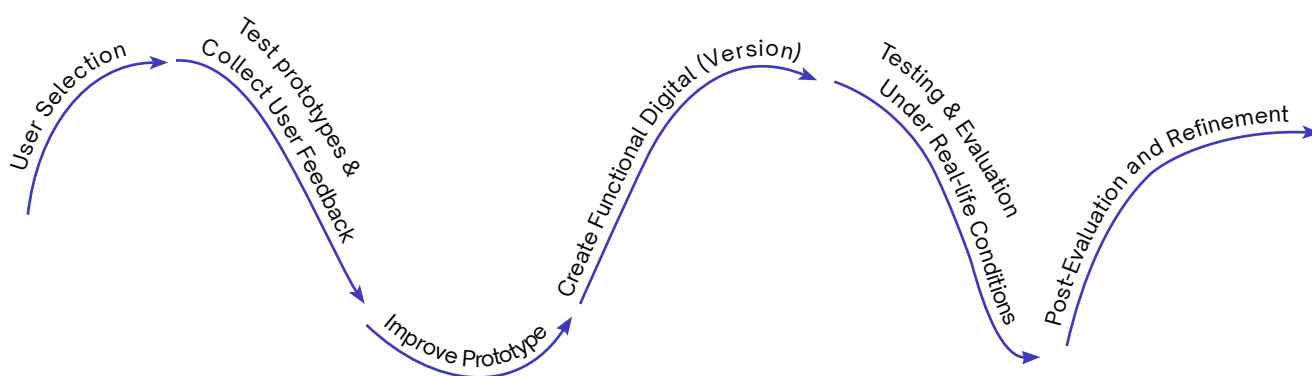
### BEST LOW-CODE PLATFORMS

→ <https://www.softwaretestinghelp.com/low-code-development-platforms/>



# Step 3: Testing & Piloting

The goal of this step is to bring to the users the ideas generated in the previous step and test them. First, simple version of the ideas (prototypes) are tested, and then, a version of those ideas is further developed into a functional (digital) version that is tested with users under real-life conditions.



## Prototype Testing

The goal of this step is to gather user feedback on some of the most promising initial ideas and early prototypes to continue developing the ideas into a sound solution. Through constant iteration, the feedback helps to specify and improve the idea. At the end of the prototyping phase, you will ideally have one solution that you can bring forward to development and piloting.

To get a good understanding of user experience and usability, **it is crucial to observe users' interactions with the prototype**. Especially to understand specific usability issues that might be faced by female farmers, we recommend not only to ask for reflection and feedback, but observe how they engage with the tool non-verbally. Observing actual usage of a simulated digital tool or service can generate important insights that farmers would not be consciously aware of. You can ask the user to complete a task by giving them a specific use scenario and you observe silently.

In the testing phase make sure you **use examples that the community (and especially women!)** can relate to. Otherwise you might end up creating a debate around the content you are presenting, instead of testing the usability of the prototype, which should be your end goal.



## Example

### Prototyping with farmers in Kenya

The goal of the project was to increase the user friendliness of the feedback generated by an agricultural citizen science platform for participating farmers, where farmers had to test different seed varieties in their farms and provide their observations.

The team generated several paper prototypes visualizing different ways of providing feedback to farmers that participated in the collective experiment. When creating the paper prototypes the team made up different rankings about which variety would be the most preferred and which one the least. Then they brought them to the farmers, expecting a discussion around how the data was visualized. Instead, users spent most of the time discussing about the ranking presented, because it did not match their experience. This showed us how important is to present data that matches the reality of the users we are working with.



Photo credit: Biodiversity International / Jeske van der Gevel

## SEE ALSO

### Tips for testing

#### INVOLVE DIVERSE TEST USERS:

Identify a diverse and sufficiently large group of test users. When working with partners, develop clear guidelines on who should be targeted during the testing phase, as your partner may be recruiting the test users.

#### REPRESENT THE DIVERSITY OF YOUR TARGET USERS:

Involving only community leaders, for example, should be avoided.

#### FOR EFFECTIVE RECRUITMENT, TECHNOLOGY TESTING CAN BE INTEGRATED WITH RELATED ACTIVITIES:

For example, farmer field school meetings could be used to introduce your digital service.

## Beta Version Testing And Piloting

Once you have developed a functional, digital version of your solution, testing and piloting it under real-life conditions is essential for a final reality check of the tool before starting implementation.

**Kick-off with a training session before starting the piloting and field testing.** The session should target both field staff and participating farmers. This can also give you some first insights into which challenges might come up during the pilot. Some issues emerging from the training sessions could be corrected before the pilot goes live.

Ideally, the experimental field-testing phase lasts for several weeks, giving you enough time to observe diverse users interacting with the solution, collect data on usage, and analyse what changes are needed. **Always organize a debriefing session with the staff involved in the field testing to collect their feelings and feedback.** Results should inform improvements in the design or give a better idea on how to develop the implementation strategy of the tool. Piloting will probably start at a small scale, and then through iteration and several testing cycles, the solution will prepare for large-scale implementation and scaling.

### Example

#### Gathering feedback from participants in Kenya



Photo credit: Bioversity International / Jeske van der Gevel

In one of our projects, we tested different methods to provide collective feedback to participants after running a citizen science experiment with them, in which they had to evaluate different varieties from a given crop. The activities included workshops and several types of games. At the end of the exercise participants were asked to rate the activities. They had to place, in a carton board, a dot in a sad face if they didn't like the activity and in a happy face if they really liked it. However, because they were observed while placing the dots, everyone gave the best rating to all the aspects. Therefore, a way that we thought was anonym and very easy to do turned out to not provide us the information we were looking for.



Photo Credit: Action Against Hunger, Guatemala / Luis Melgar

## Food Security Monitoring in Guatemala

With a government entity we engaged in a user-centered design process for a community-based digital food and nutrition insecurity monitoring system.

At the core of the system is the collection of data that are considered early warning indicators for food and nutrition security deterioration. Key informants in the communities, especially women, contribute to the data collection. Water quality is a factor that is assumed to contribute to-. Low water quality can contribute to diarrhea which hinders the uptake of nutrients from food, especially among small children. In the design process it was decided to ask for water quality in the village using a percentage scale. Community members should indicate whether they considered water quality to be at 100 % or lower. During the piloting and testing phase it became clear that this indicator did not work, data collected was very unreliable. But the field-testing revealed that women had a very good knowledge about the presence of intestinal diseases (diarrhea, parasites etc.) among children in their community and thus this was a much more straightforward indicator that the design team would not have discovered without testing.

→ [https://www.biodiversityinternational.org/fileadmin/user\\_upload/Factsheet\\_Muller\\_2019.pdf](https://www.biodiversityinternational.org/fileadmin/user_upload/Factsheet_Muller_2019.pdf)



## Tips and learnings for piloting

### Emphasize the importance of testing:

Field testing and piloting should be part of your design process, so allocate sufficient budget to this activity. It is important to have the involved stakeholders on the project on the same page about the importance of testing and piloting to avoid misunderstandings. From experience with commercial software, partners may be used to receiving ready-made solutions. The idea of testing a beta-version, which is not the final product yet, may not be intuitive to everybody.

### Track who uses your solution:

To be able to evaluate the inclusiveness of your solution, you should collect (anonymized) socio-demographic data about users, such as gender, age, or education level. If you are able to track individual usage of your solution (e.g. through unique caller IDs), this can help you to assess important metrics, such as the share of female users. If not, a user survey after the pilot can help, where you ask test users to recall their use behavior, allowing you to analyze associations between gender and usage.

### Give test users enough time:

Direct observation has some shortcomings, as users might feel intimidated and change their behavior intentionally (Hawthorne effect). They might not show difficulties with the tool or overplay frustrating experiences. To get a better understanding of contextual fit, especially for women, they should test the tool over an appropriate time period (depending on the solution we have experienced testing duration from a few days to several weeks or a full agricultural season) and ideally also without direct observation (under real-life conditions). Identify and apply qualitative or quantitative tools that allow you to document their experiences with the tools and their feedback. You could use regular focus group discussions for debriefing, make regular calls or provide a hotline where farmers can leave an audio message with their feedback.

### At any moment welcome improvements:

Make sure that the results of the testing and piloting phase can influence the design of the tool, remember that it is an iterative process, where new understanding of context and user preferences can still at later stages influence the design of the tool. Never consider your design to be 'final'!

## Document every perspective:

Make sure that the observation and learning during the piloting and testing phase is properly captured and documented. For this you should develop context-sensitive tools to document the testing. One way to elicit direct user feedback is the “Think-aloud technique”: you motivate the user to speak out loud anything that comes to their mind while using the tool.

## Include non-users in your analysis:

Expect a certain level of attrition during the testing phase. Interviews and individual usage observation after the pilot, specifically addressing non-users and users who quit usage during the pilot, can help to identify design features that hindered or demotivated continued usage by these users in particular.

## Prepare evaluation questions:

With many digital tools, use needs to be for a longer period of time, so direct observation might be difficult. You can define questions to ask retrospectively. After the pilot phase, you can visit farmers and ask the questions, or call a few farmers regularly during the piloting phase. Design the survey in a way that assures you capture gendered experiences with the tool  
→ <https://www.biodiversityinternational.org/e-library/publications/detail/practical-tips-for-conducting-gender-responsive-data-collection/>

## Collect metrics during and after the pilot:

To assess the usability and user experience from a more quantitative viewpoint, you can accompany the testing and piloting with some generic indicators. The System Usability Scale (SUS) and the Usability Metrics for User Experience (UMUX) are validated, widely applied metrics to understand usability aspects, digital confidence, behavior change and others. Surveys can be delivered through field staff, mobile phones apps or calls. You may be interested in other metrics that are specific to your solution, in that case make sure you are technically able to collect them during the pilot. For example, share of successful vs. failed calls in an IVR hotline, share of returning vs. one-time users, accuracy of data entered into an app, and so forth.

## Be frank about limitations:

Depending on the type of digital service, it may be important to emphasize that you evaluate a test version, and system errors may occur. If you can, delineate the pilot period in advance and tell test users up to what point the service will be available in its current form. Keep in mind that you are asking test users to use a service that might turn out not useful to them.

## Tools & Methods

# Testing and Piloting

## General

### USER EXPERIENCE EVALUATION

User experience includes all aspects of the end user's interaction with a product or service.

→ <http://www.allaboutux.org/files/UX-evaluation-methods-CourseMaterial.pdf>

### USABILITY EVALUATION

Usability is an important aspect of the overall user experience. It involves effectiveness, efficiency, and satisfaction where users can complete certain tasks as easy as possible.

→ <https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/usability-evaluation>

### PROTOTYPE TESTING

The following link includes different tools for quick prototype testing:

→ <https://www.secretstache.com/blog/prototype-usability-testing/>

## Specific tools

### CARD SORTING

This method helps to find out how, for example, the user prefers the website information to be structured.

→ <https://www.smashingmagazine.com/2014/10/improving-information-architecture-card-sorting-beginners-guide/>

### UX WALKTHROUGH

It is a technique to identify usability and accessibility issues in a website or application. It is a procedure for examining a user interface following a set protocol and making assessments based on predetermined criteria.

→ <https://guide.inclusivedesign.ca/tools/ux-walkthroughs/>

### USER OBSERVATION

A great way to understand the usability of a product is to observe users interacting with it. Conducting observations is easy to do and can be quite fast.

→ <https://www.interaction-design.org/literature/article/how-to-conduct-user-observations>

### THINK ALOUD

In a thinking aloud test, you ask test participants to use the system while continuously thinking out loud — that is, simply verbalizing their thoughts as they move through the user interface.

→ <https://uxdesign.cc/usability-tests-in-a-nutshell-1baa6744be10>

### SUS

It is a survey that provides a “quick and dirty”, reliable tool for measuring the usability. It consists of a 10 item questionnaire with five response options for respondents; from Strongly agree to Strongly disagree.

→ <https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html>

### UMUX

it is a four-item Likert scale used for the subjective assessment of an application’s perceived usability. It is organized around the ISO 9241–11 definition of usability.

→ <https://uxpajournal.org/assessing-usability-metric-umux-scale/>

### DIGITAL INCLUSION METRICS

this is a relatively new field and metrics for the inclusivity of digital agriculture in developing countries are still developed.

Please refer to the authors for more details.

# Step 4: Implementation and Scaling

If you feel your prototype has passed the reality check in the piloting phase, then you are ready to start implementing your solution. Although you might start implementation, still be open to user feedback and iteration! Implementation and scaling is a complex endeavor, a fit-for-purpose solution is one cornerstone of successful scaling, but context, funding, partnerships are also incredibly relevant.

This guide has been oriented in bringing the idea of user-centered and inclusive design for digital tools development closer to people working in the area. Here, we will provide a short reflection and some useful links that we think are interesting and relevant for implementation and scaling.

## SOME GENERAL COMMENTS

- ✓ **Identify simple indicators** that the implementing organization can track to maintain an idea of how well your solution is working and how gender-inclusive it is, such as the gender ratio among users, gender ratio of usage frequency over time.
- ✓ The partner organizations or colleagues who are working on the implementation and scaling need to be aware of gender-specific adoption and usage limits and need to be sensitized to recognize these. In short: **everybody needs to speak the same language in terms of gender and digital inclusion!**



# Implementation and Scaling

## Information on how to develop business models

Business model canvas is a strategic management model used for developing and analyzing business models. Here is a guide for beginners:

### THE 20 MIN BUSINESS MODEL PLAN

→ <https://www.alexandercowan.com/business-model-canvas-templates/>

### SHORT GUIDE TO SUPPORT DECISION ON BUSINESS MODELS

→ <https://cgspace.cgiar.org/bitstream/handle/10568/100399/1903.pdf>

## Scaling

Scaling Readiness is an approach developed in the CGIAR that supports the development of scaling strategies:

→ <https://www.scalingreadiness.org/>

Gender responsible scaling is an add-on to Scaling Readiness that allows to control for unintended consequences e.g. on gender relations in the scaling process.

→ <https://gender-portal.rtb.cgiar.org/scaling/>

(Final version will be available in 2022, for details contact Anne Rietveld [a.rietveld@cgiar.org](mailto:a.rietveld@cgiar.org))

## Monitoring and Evaluation

Some useful questionnaires and surveys developed by the CGIAR are:

### WEAI AND PROJECT-BASED WEAI

→ <https://weai.ifpri.info/>

### 5Q

→ <https://alliancebioiversityciat.org/publications-data/monitor-climate-smart-agricultural-interventions-real-time-participatory-tool>

### RHOMIS

→ <https://www.rhomis.org/>

## 6

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Alliance

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GENDER Platform

