



Initiative for Sustainable
Agricultural Supply Chains

A Step-by-Step Guide for Successful Implementation of Traceability Systems in Agricultural Supply Chains

Entry-Level Introduction to
Traceability Systems



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Executive Summary

What is traceability?

“Traceability means the ability to track any food, feed, food-producing animal or substance that will be used for consumption, through all stages of production, processing and distribution” (European Commission, 2007)¹.

6 Steps to adopting a traceability Solution:

- **Step 1:** Find and identify the key drivers, objectives, and benefits of traceability that are needed. Questions and prerequisites regarding certification standards, (new) regulatory requirements, sustainability proofs and rewards and general supply chain information can, for example, be solved by implementing the right traceability solution.
- **Step 2:** Assessing (if available) the current information management system used for the relevant value chain, for example through storyboards, can further provide insights into what is needed.
- **Step 3:** The most important requirements for a traceability solution need to be defined. Clarifying the scope of the solution, defining the commodities of interest and creating a chain of custody model can assist in this process.
- **Step 4:** Use a stakeholder approach to get every actor involved in the value chain to support the transition to a digital traceability solution. Create awareness and a sense of urgency, assess and foster an alignment among stakeholder’s values, consult on all expectations, understand the doubts and fears, consider the capacity of the entire team, select suitable change agents, and ensure proper leadership commitment, especially by offering influence on the transitioning steps and processes.
- **Step 5:** Create a Proof of Concept and test pilot versions with minimum viable products (MVP’s) parallel with the existing data flows to ensure that there is no data-loss. Make sure to clearly communicate all transitioning steps to every involved stakeholder.
- **Step 6:** Plan enough time for the transition process and pilot/testing phases. It is important to clearly prioritise certain needs and functionalities and, if foreseeable, plan in buffer periods to avoid falling behind the time schedule.

¹ https://food.ec.europa.eu/horizontal-topics/general-food-law/food-law-general-requirements_en (Accessed: July 20th, 2022).

1. Introduction

The GIZ Sectoral Programme for Sustainable Agricultural Supply Chains and Standards is a transnational project that focuses on agricultural commodities such as coffee, cocoa, bananas, soy, rubber, palm oil and cotton and their respective supply chains. To improve the production conditions for farmers and reduce their challenges, which are often not limited to one region or one commodity, adopting a holistic approach could be the solution. Therefore, the project aims to **boost sustainability in agricultural supply chains** by supporting close-knit national and international cooperation with actors from the private and public sector and with local and national governments. The project uses multi-actor partnerships, working with representatives from the worlds of business, politics, science, civil society and industry.

The study was commissioned by the **GIZ Initiative for Sustainable Agricultural Supply Chains (INA)** and conducted in collaboration with **C-lever.org**. The goal of the assignment is to provide guidance on traceability for practitioners working on agricultural supply chains. A special focus was put on sustainability issues (environmental, social, economic) and on how traceability systems may provide benefits for smallholder farmers in producing countries in the global south.

“A Step-by-Step-Guide for Successful Implementation of Traceability Systems in Agricultural Supply Chains” is an entry-level guide which briefly touches upon what traceability is and the key aspects that contribute to effective traceability. It further elaborates on the steps that agricultural value chain practitioners can employ to aid implementation of traceability in their value chains and concludes with a checklist of criteria that practitioners can use to assess, compare and choose the traceability solution most suited for their needs.

2. What is traceability and why is it required?

Only with sufficient supply chain transparency and adherence to legal requirements can reliable sustainability claims be made, and incentives tilted towards further improving sustainability along the value chain. Enhancing and consistently ensuring the sustainability of agri-commodities is not possible without adequate forms of traceability; traceability is thus an essential part of transparent agri-commodity ecosystems that foster sustainability, as well as fairness and accountability for all parties across the value chain.

As such, traceability can never be an objective in itself. Instead, it is only a means to the higher ambition of creating a positive impact through sustainable and fair trade. In Europe and other importing regions, supply chain due diligence requirements are becoming increasingly stringent.

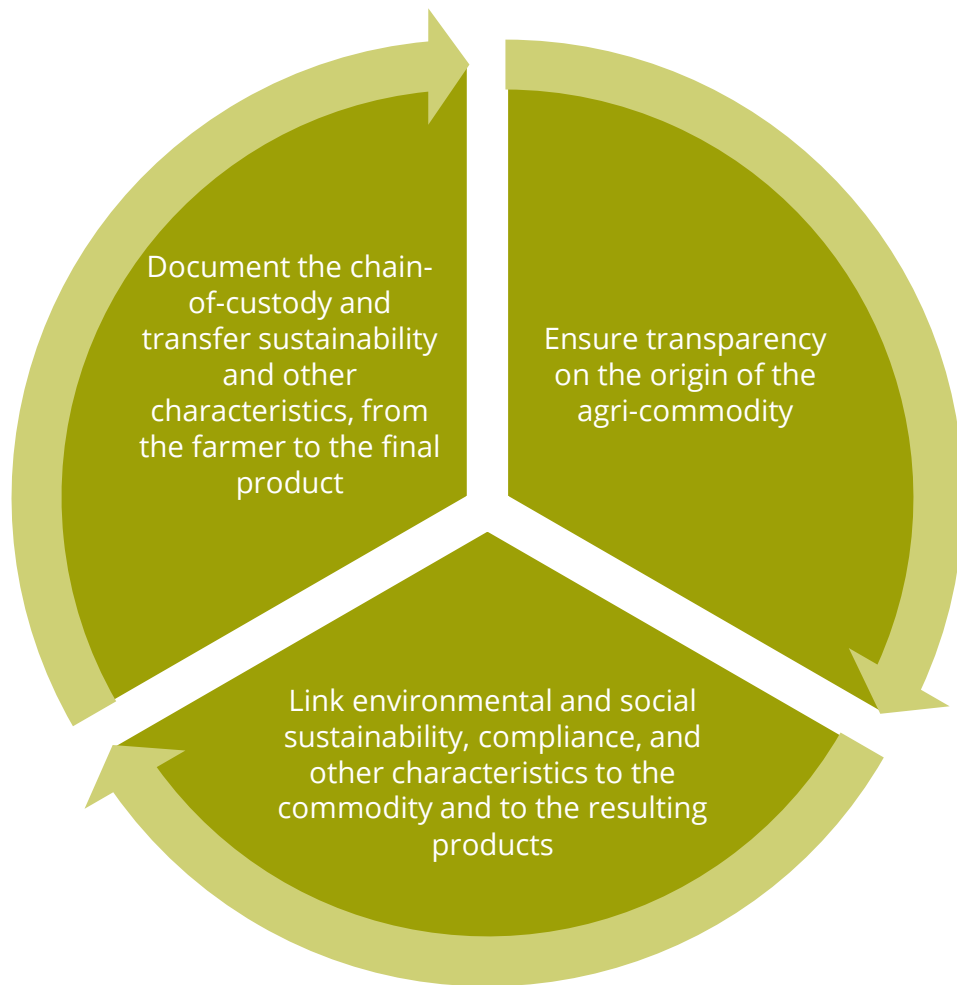
The focus is therefore not on traceability in itself. Instead, the focus lies on investing in well-documented, evidence-based good practices, and adding value for money by ensuring sustainability, safety, fairness, transparency and accountability in agricultural value chains, all while ensuring that the traceability solutions employed are cost-effective and enable social return on investment.

Since the understanding of traceability and traceability solutions can mean different things to different actors, we propose the following definition:

Traceability implies that information on origin of the agricultural commodity and on its characteristics are documented and linked to batches of the commodity, and subsequently of processed products, that such information is preserved and transmitted all along the value chain.

Source: *“Technical Brief on Cocoa Traceability in West and Central Africa”*.

Therefore, agri-commodity traceability should encompass three primary dimensions:



Graphic 1.The three primary dimensions for agri-commodity traceability.

While allowing the required transparency and due diligence in the value chain, traceability shall respect key principles of data privacy and ownership and implement feedback loops that provide relevant information to farmers and their organisations.

3. Key aspects of traceability

Given the need for and concept of agri-commodity traceability, the question arises: what are the key aspects that traceability systems should cover? Traceability should be **embedded** in a fair and sustainable **value chain ecosystem**, encompassing the following key aspects:

1. Individual approach

Traceability processes must be tailored to every actor in the value chain. Traceability should be achieved through solutions that **empower every actor**, from the first (farmer) to the last (consumer), while providing adequate incentives to motivate and consistently retain the participation of all actors in contributing to the fairness and sustainability of the value chain.

2. Accessibility and appropriateness of the solution

Solutions are needed that work in favour of all supply chain participants. While innovation should continuously be encouraged, a traceability solution should be sufficiently robust and **'fit for purpose'** (e.g. data recording in remote/rural settings, question of proper internet connectivity, etc.).

3. Cost-effectiveness

It is important that sustainability is sought and guaranteed in a cost-effective manner; economies of scale can still function and offer the necessary financial incentives to actors to contribute fully to this shared ambition. Systems need to be low-cost and able to handle smallholder transactions, making them more inclusive and accessible.

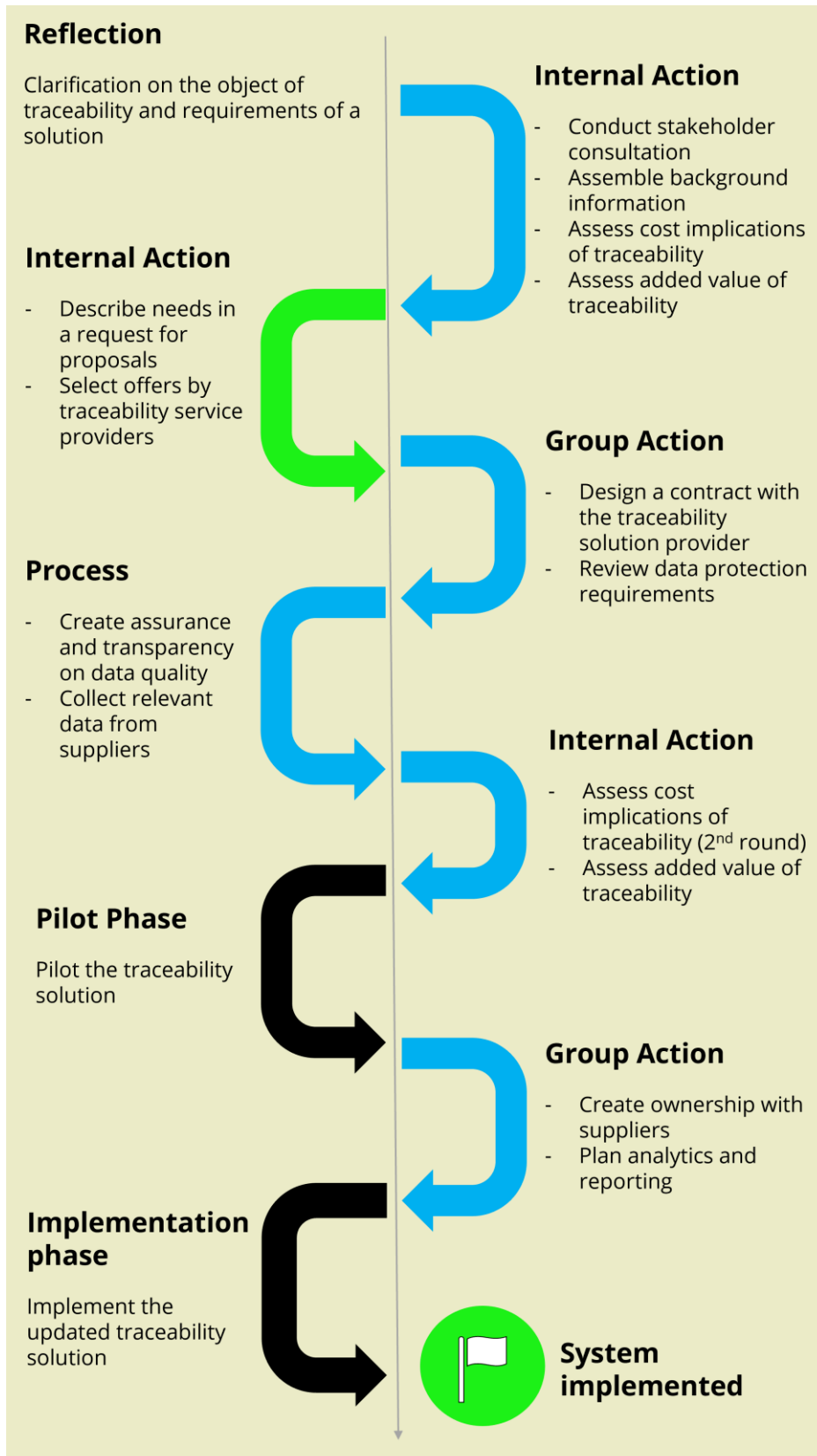
4. Transparency and accountability

The required transparency and accountability, and corresponding incentives, should **stimulate broad adherence** to principles of a fair, sustainable and cost-effective value chain. An ideal traceability system is part of an **ecosystem** which allows sustainability to thrive and continuously evolve, while ensuring access to information for all stakeholders in the value chain.

5. Interoperability

A traceability solution cannot function in a vacuum. Technical and content **interoperability** is key to ensure the effective functioning of a traceability system.

4. Implementation timeline



The graphic above shows a timeline of the steps, internal and external, that can guide the implementation of traceability in a value chain. These steps are elaborated upon in Section 5 of this document.

Reflection corresponds to Step 1 below. Steps 2, 3, 4 and 5 are iterative processes that correspond to the actions from conducting stakeholder consultations to piloting the traceability solutions. These steps involve a combination of individual and group actions with internal and external stakeholders. Step 6 provides an understanding of the potential timeline in the implementation of the previous steps and then on until the implementation of the system.

5. Steps in adopting traceability

5.1 Step 1: Reflecting and understanding motivation

Identifying the **key drivers** to traceability is important so that choices can be made in terms of the **objectives** and expected **benefits**.

- a) For tropical commodities, **certification standards** require insight into the chain of custody. Only actors along such a certified chain can handle certified volumes and ultimately sell the end-product as compliant with the (sustainability and other) requirements of the particular standard.
- b) From an operational perspective, traceability supports companies to manage their suppliers. **Supply chain information** regarding locations, quality, reliability, and turnover is valuable to optimise the financial risk and efficiency.
- c) More recently, product importers around the world are being scrutinised by consumers, investors and/or policymakers to assure no unethical practices occur along the value chain. Traditional desktop-based due diligence approaches are increasingly replaced or complemented by (more) direct assessment of the different chain actors. Identification of these intermediaries is the absolute minimum in order to conduct **verification of compliance** towards relevant sustainability principles.
- d) Accordingly, new **legally binding requirements** have been introduced. The German Supply Chain Due Diligence Act (LkSG, June 2021)², the EU Due Diligence Directive (February 2022)³, the (draft) EU Regulation on deforestation-free products⁴ and other regulations require a due diligence process that applies to all actors, including subcontractors, who make products available on the European market. Products that do not meet specific or minimal market requirements are banned from import. This legislation and these regulations have massively boosted the interest in traceability solutions.
- e) Increasingly, there is a need to be able to provide trustworthy and transparent information on the **sustainability of agricultural commodities, their related value chains** and ultimately of the resulting consumer products. Detailed sustainability information is crucial and often goes far beyond the mere certification of products.

² <https://www.bmas.de/EN/Services/Press/recent-publications/2021/act-on-corporate-due-diligence-in-supply-chains.html> (Accessed: July 19th, 2022).

³ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1145 (Accessed: July 19th, 2022).

⁴ https://environment.ec.europa.eu/publications/proposal-regulation-deforestation-free-products_en (Accessed: July 19th, 2022).

- f) Furthermore, mechanisms are being designed to **reward sustainability achievements**. This implies acknowledging that appropriate sustainability incentives are a key aspect of sustainable agricultural value chains, requiring enhanced traceability systems and their trustworthy governance.

Traceability can thus also be viewed as a pipeline:

- transferring trustworthy information on sustainability and other characteristics along the value chain, from farm level to retail and consumer level,
- while fostering and tracking the payment of a fair price and of sustainability achievement rewards as well as relevant feedback information back from the end of the value chain to the farmers and their organisations at the beginning.

See also FAQ 1

5.2 Step 2: Understanding and mapping your processes and how extended traceability will benefit your business

Once you have identified the key requirements for your purpose and identified a potential solution, the next step is to understand what capacity is required from your side to enable an effective onboarding of the solution.

Before approaching traceability solution providers, it helps tremendously to establish a more detailed understanding of your (and your stakeholders') needs and expectations. Not a single traceability solution will operate in a vacuum; they always depend on, or at least interact with, existing information frameworks. Therefore, it is wise to first take stock of the **current information management systems** used in the organisation and/or value chain partnership (databases, spreadsheets, hardcopy files, apps, servers, etc.).

Simulating (i.e. documenting and understanding) the (existing and desired) flow of data between data sources and indicating who provides what information and who might have to validate is key. Doing this will allow you to detect hot spots of inefficiency and risks where data integrity can get compromised. You should also map and document the analogue information flow ("chain of custody" paper-trail, processing reports, contracts, etc.). Doing so can offer new insights where more efficiency can be achieved by digitising operations further.

After the situational assessment, it is time to sketch out the preferred look for the future traceability solution interface. Storyboards are defined ([source](#)) as "a graphic portrayal of a narrative, concept, or script, divided into sequential scenes (panels)". Under step 2, storyboards may be used to visualise the solution and imagine interaction with the different features to access relevant data points. Such storyboards offer the opportunity to reflect upon daily user needs and map how data needs to be linked together.

The above insights can then be used to **simulate the data flow**. At this level, basic spreadsheets suffice to show the analytical manipulations needed to respond to the different

use cases. Using live data (picked from existing data sources) will make this step more tangible and realistic. Ultimately, insight from the user cases, storyboards, scope and user access will help to identify the most appropriate solution(s) that is fit for your purpose.

Please note that you might choose a single platform or opt for an integration of several (partial) traceability solutions that, combined, are best for your needs. In the latter case, make sure to check for the interoperability options of the different system to guarantee the easiest and most efficient use of all systems together.

See also FAQ 4

5.3 Step 3: Clarifying your requirements for a traceability solution

In order to select the right traceability solution, there is first a need to define the **requirements** in more detail. **See also FAQ 2**

1. Scope of the solution

The first aspect is to define the **scope** of the solution. Understand **what parts of the value chain** require most attention for your needs and explore if a particular solution of interest covers them. For instance, if you are catering for end consumers, you may find solutions that offer features catering to retail and consumer countries to be more useful. Whereas if you are more focused on procuring (sourcing) agricultural commodities, you might find solutions that offer features specific to production/origin countries more suited for your needs.

2. Define commodities of interest

Next, it is essential to define the **commodities** of interest since each solution can cover different commodities. A traceability solution may be specifically developed to support particular commodities and might thus require some adjustment to work with new ones. It is, however, essential to understand that it might be feasible to expand the scope of solutions offering technical features that are particularly suited for your needs in order to accommodate for the relevant commodities of interest.

3. Chain of custody model

Third, there are four common chain of custody models: **Identity Preserved, Physical Segregation, Mass Balance and Book & Claim**. These differ from each other in how the product is handled in each step – in terms of aggregation and how related data is subsequently handled towards making claims. It is important to review whether the traceability solution of interest is compatible with the chain of custody models that are important for your current (and future) business.

In addition to these three basic requirements, in order to choose the traceability solution that is most suitable for your purpose, you can explore additional criteria depending on your needs (*an overview of such criteria is provided as a checklist at the end of this document*).

Once the features related to your functional needs have been identified, it is time to explore if a particular traceability solution is compatible with your technical needs.

Additionally, it is always useful to understand what sort of support is provided by a solution and whether the type and conditions of support are adequate for you to implement the solution in your value chain.

Lastly, you should work out what sort of **payment structure** will be required to implement the solution and seek the solution most aligned with your financial plan. It must be noted that several solutions offer different payment structures based on the type of value chain, so this is an essential theme to discuss with the solution provider.

5.4 Step 4: Ensuring internal capacity and stakeholder involvement as required for the implementation

Converting conventional sourcing operations to adopt contemporary traceability in the supply chain sounds daunting and may require considerable investment. It would be a complete waste of effort to start a full-scale process in the absence of adequate commitment of all the key parties involved.

A **stakeholder approach** is recommended to ensure the required stakeholder commitment and involvement and thus also the feasibility of your traceability endeavour.

See also FAQ 3

a) Create awareness and sense of urgency

It is essential that you understand the expectations of your stakeholders (see Chapter 6.4b)) and that they grasp the importance, necessity and benefits of effective traceability. This means ensuring that your stakeholders can themselves benefit from traceability.

b) Assess and align stakeholders' values

People's actions often relate directly to their own value system. Strategic transition from bulk commercial operations towards fully traceable operations often causes an organisation/company and its stakeholders to rethink their corporate and personal values. Such a transition can affect the personal interests of involved parties which may lead to resistance to adopting new practices. Nevertheless, such a transition can also help in uncovering unethical business practices and ultimately strengthen the existing ethical ones. Embracing specifically sustainability-driven and data-driven value chain practices will only enhance opportunities for longer term economic success for all parties involved.

Such sustainable and ethical behaviour can be incentivised and rewarded, for example, resulting in enhanced access to impact funding and lasting win-win partnerships. It is important to support value chain actors in the transition process. For example, this may mean designing and transitioning towards new business models and new cultures for value chain intermediaries.

c) Consult on expectations

The introduction of such new systems offers the opportunity to address long-standing inefficiencies in the organisation. Stakeholders should use this opportunity to reflect on past issues in their supply chain processes.

For example, field officers may have trouble in mobilising farmers for training in their area. Suppliers may struggle to keep track of the most active producers and their transaction

history. Procurement managers may struggle with reporting volumes in manual spreadsheets which need continuous editing. Board members may be unsure about the compliance of their company with environmental, social and governance (ESG) requirements.

Such secondary features could be considered to add to the scope of the traceability solution in order to create more support from stakeholders. The essential message here is that introducing (improved – state-of-the-art and future-proof) traceability should not create additional burden on value chain actors. Traceability solutions should be embedded in integrated systems that make their work more efficient, more sustainable, and more profitable.

d) Understand doubts and fears

New things can be uncertain. Staff may be worried about the extra workload or the challenge of using digital tools. Suppliers may be worried that disclosing their producer base will allow upstream buyers to bypass them.

Listening to their concerns is a fundamental step in addressing them and creating a better understanding. While responding to their fears, it is essential to demonstrate new business opportunities arising with state-of-the-art traceability, and the risks of not succeeding in doing so.

e) Assess the capacity of the team

With a clear overview over the capacity of the team, it becomes clear which skills need to be strengthened (and thus invested in) to improve the uptake. Experience with digital devices such as smartphones and laptops is essential. Additionally, experience with internal management systems is often a sound proxy for success. At the lowest level, lack of basic adherence to procedures and reporting requirements may already be a limitation. Capacity building to address this limitation right from the start would go a long way in ensuring successful and effective implementation.

f) Select change agents

Within an organisation there will be different levels of involvement to spearhead the demanding transition towards traceability. During the initial stakeholder mapping, it is advised to select change agents (*persons who are skilled or have the ability to learn quickly, passionate about bringing about a change and have the ability to motivate others*) within each stakeholder category (departments, suppliers, producers, intermediaries, transporters or service providers, etc.). Such change agents can take the lead in reviewing stakeholder requirements, testing, and providing feedback.

g) Ensure leadership commitment

Ensuring leadership commitment is one of the most critical factors for successful implementation. Deconcentrated leadership and missing commitment further increase the risk of individuals exploiting internal differences to not pursue traceability.

The same risk applies when leadership itself violates the organisational values and is perceived to act in self-preservation rather than in the interests of the organisation and/or the value chain partnership. Sometimes a specialist is needed to support the change process and guide the stakeholder approach.

Commitment is made tangible by: (i) providing core staff with time to invest in preparing, selecting and testing solutions; (ii) providing a budget to hire the services of specialists and the right traceability solutions and providers (not just the cheapest ones on the market) and (iii) offering support to the core staff to allow for a learning process and ensure minimal disruption during transition.

h) Offer influence





Create regular feedback moments during the implementation. Allow stakeholders to share their experience during the transition and offer them the ability to influence both the concrete design and/or configuration of the traceability solution and its practical implementation at different levels.

5.5 Step 5: Understanding the working stages required for a successful implementation

To implement contemporary traceability, operations, business concepts and value chain relations often need to be adapted or even sometimes completely transformed. Therefore, supporting all stakeholders in the change process and avoiding undue disruption and confusion is key.

It may be tempting to dive in with a comprehensive digital solution and rush the implementation of digital conversion as soon as possible. However, premature roll-out and implementation will most likely lead to confusion and disruption with an immediate negative effect on stakeholder trust, commitment, and morale.

Checklist for limiting disruption to core business

-  Ensure Proof of Concept
-  Pilot minimum viable product (MVP)
-  Run pilot version in parallel with the existing data flow
-  Communicate to the stakeholders involved

A **Proof of Concept** is needed before rushing into implementation:

An important part of the preparation can be based on a hardcopy paper trail and documentation of all relevant transaction and processing steps. It is essential to have a detailed map of existing practices and then simulate the new process flow. This information can be tracked in a spreadsheet which is updated regularly by a data clerk to replicate the Chain of Custody steps. Running this for a few days continuously for all given scenarios provides a very fast understanding on what existing functionalities the traceability solution is expected to cover. It is much easier to make corrections to a simulation using a spreadsheet than it will be to an already rolled-out traceability system.

However, trying to fully mirror the existing practices in the new traceability solution is often a huge pitfall. Implementing a (new/improved) traceability system should not be about adding additional traceability requirements on top of the existing workload. It should be about a more holistic transformation where processes are reviewed and optimised, and where contemporary traceability is achieved without increasing the total administrative burden of

value chain actors. It is essential to understand the potential for optimisation that is generated through state-of-the-art traceability solutions and appropriate integration with other systems.

Obtaining a **Proof of Concept** generally requires a learning and improvement process alternating between conceiving/improving the concept and piloting it in a test environment. After simulating in the core design group, it will be essential to test in a parallel setting with real stakeholders who are well-coached and committed to contribute to such exercise.

Referring back to the prioritised functions of your traceability solution, you will see that these can be grouped into clusters. Within the traceability solution, these will likely take the form of modules which are used by particular users for particular purposes.

Typical modules can be:



Each of these modules should be piloted as **minimum viable product (MVP)**. MVP's offer just the core functionality without any secondary benefits, nice polishing, or extras.

Disruption can be minimised **by running this first pilot version in parallel** with the existing data flow in the organisation. The drawback of extra work is negligible compared to the discouraging effect of a prematurely implemented and thus malfunctioning new traceability system which has already replaced previous systems. The traceability solution should only be integrated into the core operations of the organisation once pilot versions for a given module have been reviewed, tested for all given circumstances, and considered perfect. Keeping the former (hard-copy or less developed) system running for a bit longer is wise from a continuity assurance perspective. Risks are often encountered when subsequent updates to the traceability solution take place or during the onboarding of additional modules to the selected solution.

When designing a new traceability system, and again before rolling it out, it is essential to ensure that the new way of working benefits all value chain actors involved. It is essential to clearly communicate in a trustworthy manner all of this to the stakeholders involved. After completing all the steps discussed thus far, stakeholders might be more motivated to support the process of implementing a traceability solution.

See also FAQ 20

5.6 Step 6: Time required for implementation

With the right preparation and motivation, it becomes a lot easier to start the implementation process.

A **pilot phase with each minimal viable product (MVP)**, as discussed in **Step 5**, will likely consist of both desktop review and field review by selected ultimate users included in the pilot testing team. The sooner the end users are provided the opportunity to give feedback, the more efficient the improvement cycle will run.

It is common to see that the first version can be reviewed with relevant feedback in just a day. Later versions might need up to one or two weeks of field testing to explore all different scenarios encountered.

Typically, a pilot phase can take between four to seven iterations before functioning as intended. The efficiency (and fun) of these cycles will highly depend on the developer/customisation team understanding the user side of it and the users knowing what they expect in advance. With several modules to be customised through multiple iterations it becomes clear that implementation is not a matter of weeks but often months, while progressing to more advanced levels of traceability or progressively adding new modules to the system can be spread over several years.

As you move along during implementation, you need to be aware of **scope creep**. While it is possible to add particular wishes as you go, it helps to clearly prioritise developments, unless something fundamental was lacking when priorities were initially set. New demands should be recorded and followed up on in a next round of implementation of the solution. Good, future-proof traceability solutions are flexible and allow for activation of additional features, data fields etc. when those are needed.

Particular attention needs to go to the aspect of absorption capacity of less digitally literate supply chain actors. Rather than expecting a complete transformation with all modules at once, it would be wise to spread the ambition out over multiple sourcing seasons. This is especially recommended when the digital data collection occurs in parallel with the old-fashioned paper trails and creates extra workload.

It is also wise to plan conservatively and include a buffer period for unintended technical hiccups. Having that Plan B in place (yes, back to the previous working processes) will help to avoid the stress resulting from derailed implementation plans).

(See also FAQ 21)

6. Checklist of potential requirements fitting your needs

Below you can find a simplified checklist to select and assess traceability solutions for your particular needs.

| | |
|--|--|
| On which part(s) of the value chain does the solution focus? | |
| What commodities are supported by the solution? | |
| Does the payment structure align with your needs? | |
| Does the solution support registration of value chain actors? If yes, for which type of value chain actors? | |
| Does the solution offer geo-mapping? If yes, how does the solution collect geographical information of farming plots? | |
| What Chain of Custody model(s) are supported by the solution? | |
| What type of characteristics may be linked to the origin of the products? | |
| Does the solution allow for reporting on key indicators? | |
| Does the solution offer feedback loops? | |
| Does the solution support certification audits? | |
| Does the solution allow verification of sustainability claims? | |
| Are capacity building services provided to guide users? | |
| To what extent is the solution operational without internet connectivity? | |
| Is the solution multilingual and does it allow change and customisation of language, terminology, and jargon to adapt to the user needs? | |
| Is the solution based on blockchain technology? | |
| Does the solution offer functionalities to support financial transparency? | |
| Does the solution offer functionalities to provide financial access? | |
| Does the solution offer functionalities to support market linkages? | |
| Is the solution interoperable with other IT applications? | |

Further, you can find some additional **illustrations** on applying such requirements to select a fit-for-purpose traceability system.

- If you are looking for a solution that addresses traceability in production/origin countries and focuses on ensuring first mile traceability, then it is important to understand what kind of registration and identification features are offered by a solution of interest. Here, it is also essential to explore what sort of data can be gathered from interoperability with existing resources in your region of interest. For instance, if you are looking for a solution that enables registration of farmer data, knowing if the production country offers national identity cards and if the solution has features that can utilise this data could help the registration processes. It is also essential to note what type of value chain details can be registered using the solution (farmers, farms, farming plots, intermediaries, farmer associations, cooperatives, transporter, warehouses, traders, processors, consumer brands, retailers, etc.)
- If you are seeking to enhance traceability in your value chain to support sustainability reporting, it is essential to know whether the solution offers features on collecting, linking and reporting on sustainability characteristics linked to batches of the commodity. If deemed necessary, explore if a solution of interest offers the linking of characteristics that are important for your vision and expectation from traceability. For instance, if you are seeking to procure commodities from regions that are at risk of deforestation, explore if the solution offers features on linking details pertaining to deforestation/forest preservation data. If your focus is on ensuring there are no child labour practices in your value chain, explore if the solutions allow for linking data on child labour monitoring and remediation along the chain of data. Accountability on sustainability claims is also a key feature to explore, especially with regard to certification and due diligence. Explore if the solution offers features on reporting on key indicators that are of interest for you.
- If you are seeking a traceability solution to mitigate risks in your value chain and/or to enable support in certification audits, exploring the kind of features offered by a traceability solution in addressing these features is essential. Here, it is also key to understand that where claims are made, verification of such claims and validation go hand in hand. Therefore, explore if the traceability solution offers features on if and how such claims can be verified.

7. Implementation Guide - FAQs

This section provides guidance on “advanced” traceability for stakeholders of (tropical) agricultural value chains.

Using a FAQ (frequently asked questions) approach, this document responds to typical questions raised by those who engage in traceability and/or who want to better understand what evolving traceability is about.

FAQ 1: Why do we need traceability?

Buyers of agricultural products, their customers and investors, as well as the authorities of importing countries, are increasingly requesting trustworthy information on the origin and on the environmental, social and governance characteristics of the products they buy, invest in or allow on their national markets. One way to provide the requested information that is growing in popularity is through traceability systems.

Often the ambition towards traceability is first expressed in direct response to a new policy requirement, client demand, or operational need. Reflecting upon internal alignment and identifying the **key drivers** to traceability is vital in order to define the **objectives** and expected **benefits of traceability**.

- 1) For tropical commodities, **certification standards** require insight into the chain of custody. Only actors along such a certified chain can handle certified volumes and ultimately sell the end product as compliant with the (sustainability and other) requirements of the particular standard.
- 2) From an operational perspective, traceability helps companies to manage their suppliers. **Supply chain information** regarding locations, quality, reliability, and turnover are valuable for reducing the financial risk and optimising efficiency.
- 3) More recently, product importers around the world are being scrutinised by consumers, investors and/or policymakers to ensure no unethical practices occur along their value chain. Traditional desktop-based due diligence approaches are increasingly replaced or complemented by (more) direct assessment of the different chain actors. Identification of these intermediaries is the absolute minimum requirement for **verifying compliance** towards relevant sustainability principles.

- 4) Accordingly, new **legally binding requirements** have been introduced. The German Supply Chain Due Diligence Act (LkSG, June 2021)⁵, the EU Due Diligence law (February 2022)⁶, the (draft) EU Regulation on deforestation-free products⁷ and other regulations require that a due diligence process applies to all actors, including subcontractors who make products available on the European market. Products that do not meet specific or minimal requirements are banned from import. These legislations and regulations have massively boosted the interest in traceability solutions.
- 5) Increasingly, there is a need to be able to provide trustworthy and transparent information on the **sustainability of agricultural products and value chains**. These trends imply the need for detailed sustainability information of the products, going far beyond the mere certification of products. Mechanisms are being designed to reward sustainability achievements, acknowledging that enhanced traceability systems are a key aspect of sustainable agricultural value chains and their trustworthy governance.

It is important to note that **traceability is never a purpose in itself**. Instead, it is a means to a particular objective (e.g., due diligence compliance, value chain sustainability, fairness, transparency, etc.).

FAQ 2: What kind of traceability solution is needed?

In order to select the right traceability solution there is first a need to define the requirements in more detail, starting with the scope of the solution. Do you expect a fully-fledged ERP system⁸ which covers all departments and information flows of the business? Or is a basic Chain of Custody tool tracing the volumes along the chain sufficient? A list of potential requirements is provided on the [Traceability Solutions Platform](#) and can be used as a checklist.

Second, it is essential to define the **commodities** of interest since each has its own technicalities. A traceability solution may be specifically developed to support particular commodities and might thus require some adjustment to work with new ones.

Third, the **Chain of Custody (CoC) model** is one of the key elements of most sustainability standards systems. Such systems often combine both a CoC model and an assurance system for compliance with the requirements of a particular (sustainability) standard, label or

⁵ <https://www.bmas.de/EN/Services/Press/recent-publications/2021/act-on-corporate-due-diligence-in-supply-chains.html> (Accessed: July 19th, 2022).

⁶ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1145 (Accessed: July 19th, 2022).

⁷ https://environment.ec.europa.eu/publications/proposal-regulation-deforestation-free-products_en (Accessed: July 19th, 2022).

⁸ ERP system stands for an Enterprise Resource Planning system, catering for the management of all the information and resources involved in a company's operations by means of an integrated computer system.

product processing steps. There are different CoC models available, which all differ in how the product is handled in each step, e.g., in terms of aggregation and how related data is subsequently handled towards making claims.

There are four common CoC models: **Identity Preserved, Physical Segregation, Mass Balance, & Certificate Trading**. For details see *Textbox of CoC models*.

| Aspects of CoC model | Identity Preservation | Physical segregation | Mass Balance Batch level | Certificate Book & Claim |
|---|-------------------------|--------------------------------|---|--------------------------|
| Certified material sold does not exceed certified material bought | Yes | Yes | Yes | Yes |
| Traceability linked to volume reconciliation over a set time period | No | No | Batch level: Yes Group level: No | Yes |
| Allows mixing of certified and non-certified content | No | No | Yes | Yes |
| Physical traceability | Yes | Yes | Depends on type of mass balance model (single-site level vs multi-site level) | No |
| Identify origin in actual product | Yes, complete to farmer | Depends on 'origin' definition | Depends on type of mass balance model | No |

TEXTBOX of CoC models (adapted from ISEAL Alliance, Chain of Custody models and definitions, 2016).

Understanding the CoC model needed for your situation will have a direct impact on your internal management system and traceability solution of choice. Further, it is essential to

know the number and the type of intervening **actors** in the supply chain, some of whom are **users** of the CoC system. Supply chains can be extremely complex and involve many intermediaries who all might play different roles with corresponding patterns in providing and using data. Traceability solutions may have a limit on the number of actors they can register, both laterally and vertically.

FAQ 3: What does it take to switch to (digital) traceability?

Transferring conventional sourcing operations to (digital) contemporary traceability for supply chains sounds daunting and may require considerable investment. A **stakeholder approach** is recommended to ensure the required stakeholder commitment and involvement and thus the feasibility of your traceability endeavour.

Checklist of action

- ✓ Create awareness and sense of urgency
- ✓ Assess and align stakeholder's values
- ✓ Consult on expectations
- ✓ Understand doubts & fears
- ✓ Manage the internal capacity of your team
- ✓ Select change agents
- ✓ Ensure leadership commitment
- ✓ Offer influence

1) Create awareness and sense of urgency

It is essential that you understand the expectations of your stakeholders (*see FAQ 3b*) and that they grasp the importance of and need for traceability and the benefits that can result from its effective implementation. This means ensuring that your stakeholders can themselves benefit from traceability (*see FAQ 10, FAQ 22 and FAQ 24*).

2) Assess and align stakeholder's values

People's actions often relate directly to their own value system. Strategic transition from bulk commercial operations towards fully traceable operations often causes an organisation/company and its stakeholders to rethink their corporate and personal values. Such a transition can affect the personal interests of involved parties which may lead to

resistance to adopting new practices. Nevertheless, such a transition can also help in uncovering unethical business practices and ultimately strengthen the existing ethical ones. Embracing specifically sustainability-driven and data-driven value chain practices will only enhance opportunities for longer term economic success for all parties involved.

Such sustainable and ethical behaviour can be incentivised and rewarded, for example, resulting in enhanced access to impact funding and lasting win-win partnerships. It is **important to support value chain actors in the transition process**. For example, this may mean designing and transitioning towards new business models.

3) Consult on expectations

The introduction of such new systems offers the opportunity to address long-standing inefficiencies in the organisation. Stakeholders should use this opportunity to reflect on past issues in their supply chain processes.

For example, field officers may have trouble in mobilising farmers for training in their area. Suppliers may struggle to keep track of the most active producers and their transaction history. Procurement managers may struggle with reporting volumes in manual spreadsheets which need continuous editing. Board members may be unsure about the compliance of their company with environmental, social and governance requirements.

Such secondary features could be considered to add to the scope of the traceability solution in order to create more support from stakeholders. The essential message here is that introducing (improved – state-of-the-art and future-proof) traceability should not create additional burden on value chain actors. Traceability solutions should be embedded in integrated systems that make their work more efficient, more sustainable, and more profitable.

4) Understand doubts & fears

New things can be uncertain. Staff may be worried about the extra workload or the confrontation with digital tools. Suppliers may be worried that disclosing their producer base will allow upstream buyers to bypass them. Listening to their concerns is a fundamental step in addressing them and creating a better understanding.

5) Assess the capacity of the team

With a clear overview over the capacity of the team, it becomes clear which skills need to be strengthened (and thus invested in) to improve the uptake. Experience with digital devices such as smartphones and laptops is essential. Additionally, experience with internal management systems is often a sound proxy for success. At the lowest level, lack of basic adherence to procedures and reporting requirements may already be a limitation. Capacity building to

address this limitation right from the start would go a long way in ensuring successful and effective implementation.

6) Select change agents

Within an organisation (including a value chain or supply chain) there will be different levels of involvement to spearhead the demanding transition towards traceability. During the initial stakeholder mapping, it is advised to select change agents (*persons who are skilled or have the ability to learn quickly, are passionate about bringing change and have the ability to motivate others*) within each stakeholder category (e.g. departments, suppliers, producers, intermediaries, transporters/service providers, etc.). Such change agents can take the lead in reviewing stakeholder requirements, testing, and providing feedback.

7) Ensure leadership commitment

Leadership commitment is one of the most critical factors for successful implementation. Deconcentrated leadership and missing commitment further increase the risk of individuals exploiting internal differences to not pursue traceability. The same risk applies when leadership itself violates the organisational values and is perceived to act in self-preservation rather than in the interests of the organisation and/or the value chain partnership. Sometimes a specialist is needed to support the change process and guide the stakeholder approach. Commitment is made tangible by:

- a) providing core staff with time to invest in preparing, selecting and testing solutions
- b) providing a budget to hire the services of specialists and the right traceability solutions and providers (not just the cheapest ones on the market)
- c) offering support to the core staff to allow for a learning process and ensure minimal disruption during transition

8) Offer influence

Create regular feedback moments during the implementation. Allow stakeholders to share their experience during the transition and offer them the ability to influence at different levels.

FAQ 4: How do I map existing (value chain) structures?

Not a single traceability solution will operate in a vacuum; they always depend on, or at least interact with, existing information frameworks. Therefore, it is wise to first take stock of the **current information management systems** used in the organisation and/or value chain partnership (databases, spreadsheet, hardcopy files, apps, servers, etc.).

Simulating (i.e. documenting and understanding) the (existing and desired) flow of data between data sources and indicating who provides what information and who might have to validate the data is key. Doing this helps to detect hot spots of inefficiency and risks where data integrity can get compromised. You should also map and document the analogue information flow (“chain of custody” paper-trail, processing reports, contracts, etc.). Doing so can offer new insights where more efficiency can be achieved by digitising operations further.

After the situational assessment, it is time to sketch out the preferred look for the future traceability solution interface. **Storyboards** allow future users to visualise the solution and imagine interaction with the different features to access relevant data points. Such storyboards offer the opportunity to reflect upon daily user needs and map how data needs to be linked together.

The above insights can then be used to **simulate the data flow**. At this level, basic spreadsheets suffice to show the analytical manipulations needed to respond to the different use cases. Using live data (picked from existing data sources) will make this step more tangible and realistic. Ultimately, insight from the user cases, storyboards, scope and user access will help to identify the most appropriate solution that is fit for your purpose. Please note that you might choose a single platform or opt for an integration of several (partial) traceability solutions that, combined, are best for your needs. In the latter case, make sure to check for interoperability options of the different systems to guarantee the easiest and most efficient use of all systems together.

FAQ 5: How do I organise user access?

The data flow visualisation (FAQ 4.) creates valuable insights into the critical points for the envisaged data chain governance. During each step, different users play a role. As a bare minimum, the following **user roles** can be differentiated: field officer, quality/processing controller, data manager, sourcing manager, downstream client, and system admin. Each will have access only to the modules (in the app, on the webpage or in the software) that are relevant for their use.

Access needs to be clarified and defined in terms of **user rights**, modules and chain of custody segments to avoid leaking sensitive information. Clear boundaries need to be defined between the functionality for internal use, client use and third-party use.

| Role/Module | M1: Registration | M2: Auditing | M3: Purchasing | M4: Reporting | M5: Sales | M6: Settings |
|--|---------------------|-----------------|-------------------|------------------|--------------|-----------------|
| Admin | 4 | 4 | 4 | 4 | 4 | 4 |
| Director | 3 | 3 | 3 | 3 | 3 | 3 |
| Internal management systems manager | 3 | 3 | 3 | 3 | / | 1 |
| Sourcing manager | / | / | 2 | 2 | / | / |
| Sales/Marketing manager | 1 | 1 | 1 | 3 | 3 | 3 |
| Field officer | 2 | 2 | / | / | / | / |
| Client | 1 | 1 | 1 | 1 | / | / |

Example of user right matrix (Level 1: View / Level 2: Enter / Level 3: Edit & Delete, Level 4: Set up & Layout).

This links to the various **functions** a traceability solution will offer to different parties:

- 1) A director will need to have access to all modules (M1-M6) and be able to edit data as well as modify user settings for the software.
- 2) An internal management systems manager will need access to view, edit and delete data in relevant modules (M1-M4, M6).
- 3) A sourcing manager will have to access dashboards with aggregate information to understand the performance of all processes (M3 & M4).
- 4) A field officer might need to track training attendance of producers in their area without counting farmers based in other areas (M1 & M2).
- 5) A downstream client might need relevant sustainability information about the producers contributing to a particular purchase without disclosing their biodata in detail (M1-M4).
- 6) The sales/marketing manager may be provided with access to details for marketing and due diligence obligations towards clients (M1-M6).

FAQ 6: How do I approach traceability solution providers?

At this stage you might have already explored the different traceability solutions on the market and possibly have had preliminary discussions with traceability solution providers. To move forward, your potential traceability solution provider shall receive information on what your specific needs and your particular situation are. Now is the time to describe these **requirements** in a structured way in a **Request for Proposals (RFP)**.

Below we provide a checklist on how to structure an RFP and what to keep in mind while defining requirements⁹:

- ☑ Describe your **background** and **ambition** (see FAQs 1&2)
- ☑ **Define features:** Here you can use the insights generated from the storyboards to specify the needs the traceability solution shall cater for. It is much more realistic to differentiate between “nice to have” vs. “need to have” to keep the list of features reasonable. Prioritise based on importance, costs, the timeframe (testing of pilots and MVPs) and feasibility of adopting a traceability solution.
- ☑ Be aware that the **needs of your organisation** or your value chain might require multiple interoperable systems. In this case, make sure that the providers of the necessary systems are aware and willing to cooperate to ensure efficient teamwork in the developing stages.
- ☑ **Share** the simulated **data** flow and examples of datasets, records, forms with the interested traceability solution provider(s). This allows the provider(s) to understand how the data interacts and what analytical steps the traceability solution will need to perform.
- ☑ **Share definitions of jargon.** Every organisation has its own definitions and interpretations. To ensure no confusion, it is important to share them and define the terms properly (e.g. batch, lot, stack, pile, etc.).
- ☑ If possible, share a template with the interested providers on how to **structure** their **proposals**. This makes comparing responses to the RFP easier.

⁹ Agdevco, A guide to technology implementation in agribusinesses, 2019.

FAQ 7: Market research - which traceability providers are eligible?

Traceability solutions can be categorised into three types:

- 1) **Off-the-shelf solutions**
- 2) **Customisable solutions**
- 3) **Custom-build solutions**

The difference between these can make the difference between a smooth, successful roll-out or a frustrating, complicated one.

Considering the growing amount of traceability solutions, there might be an off-the-shelf solution ready for you. Basic customisation on terminologies (such as jargon, units) or context (locations, product categories) is always required. Nevertheless, a perfectly fitting solution could already exist with the advantage of quicker implementation and runtime experience. If that is not the case, a customisable solution might be the best basis for establishing your own, dynamic and future-proof traceability system. Custom-build solutions usually involve much more development and implementation time and significant higher costs but in certain cases present the best traceability option for specific value chains.

When selecting your traceability solution provider, you may want to assess the capacity of the traceability solution provider's team based on their earlier experience with co-creating solutions with clients. Some traceability solution providers struggle to accommodate the practical aspect of implementation. Check to what extent the methodology adheres to the **Principles of Digital Development**.¹⁰

Reference checks are a very effective way to assess if a proposed solution can deliver its traceability promises. On top of this, it is important to note that some clients are inexperienced with digital processes and might have been affected unintentionally by scope drift and changing specifications. These situations are common and can lead to misunderstandings between client and provider in relation to the contracted time investment.

IT providers are known for their technical jargon. Never be shy to continue **asking for clarifications** until everything is understood perfectly. This often means that the initial approach, as proposed by a traceability solution provider, may need to be rewritten in more lay terms to have better understanding by all (including lawyers).

¹⁰ Principles for Digital Development, <https://digitalprinciples.org/principle/design-with-the-user/> (Accessed: July 11th, 2022). A quick overview is provided in Annex 2.

FAQ 8: What are the costs for transitioning to digital traceability?

Before moving into the contract phase, financial implications of venturing into up-to-date traceability need to be considered. Previous discussions with providers, other clients and stakeholders have provided you with insights on transitioning your operation towards digital traceability.

Potential costs to be considered:



The first major cost is the **investment in digital data collection assets**. Field officers and suppliers will likely enter information into a smartphone or tablet. Attention is required towards the duration and durability of its battery (especially in rural environments with irregular power supply). Mapping locations will require dependency on a global navigation satellite system (e.g. GPS, Galileo, Glonass, etc.). Note that cheaper smartphones tend to depend on the signal strength from mobile phone masts which might be scarce and/or unreliable in remote locations. Further user-related aspects are screen brightness (for use in full sunshine), durability (phones get dropped) and water-proofing (heavy rains). Currently (Q1, 2022) a mid-level robust smartphone serving all purposes tends to cost around US \$150. Certain traceability solutions may require a contracted dedicated **server or shared computing services**.

External hardware might be required to automatically collect relevant data (temperature sensors, bar code scanners, etc.) that can be connected to the traceability system. Furthermore, information may have to be shared outwards (mobile printers for receipts or “transfer of goods” confirmation documents). Such handheld printers for mobile use start at US \$300.

As pilot applications of your traceability are organised, they will take **management time** away from the core business activities. Estimating the right amount of time might be difficult but field experience indicates you should schedule at least one day a week for a senior manager, on top of dedicated project staff. Pilot implementation often allows for continued design and customisation and thus requires availability of senior management to validate the choices made.

Additionally, it is also important to budget the working time required for **training** and on - the-job learning for implementing staff. Depending on the already available skill sets there might be a need to build foundational skills on digital literacy for some staff members. Providing staff with a first (basic) smartphone could be a good starting point. Staff with

sufficient digital skills could directly benefit from customised training for the particular traceability solution.

Often overlooked are the cost implications of **engaging with producers and actors in the field**. Depending on the nature of the required data, contact moments can take a frequency from just a few times a year (rushed process with purpose to achieve compliance) to monthly (genuine long-term relationship building). Staff mobility usually depends on the use of motorcycles in remote areas which range between US \$1.500 and US \$5.000 depending on the model. Field travel often needs facilitation (overnight, lunch, etc.) depending on the distance to the nearest field office.

FAQ 9: How do I fund the transition to traceability?

Apart from the initial transition and investment costs, it is important to also keep the recurring costs of traceability in mind. Sufficient funding can come from different sources (e.g. public funding, support by development partners or grant funding by international companies at the end of the supply chain). It may be critical and highly necessary for many local organisations/value chain actors to collaborate with funding partners for a successful transition toward contemporary traceability.

Recurring operational costs of traceability (including amortisation and renewal of equipment) need to be covered through adapted value chain governance and pricing mechanisms. Completely relying on temporary donor funding for recurring operational costs can become a challenge when funding stops, and the cost of ongoing traceability operations is beyond what the organisation can cover through its value chain operations.

While temporary government support and/or donor funding can be fully justified for piloting and initial transition costs, all actors should reflect and ensure that the long-term cost of traceability will be covered through continuous value chain price-setting. In other words, it is essential that the **fixed and recurring costs** of the selected traceability solution(s) are well understood and included in your financial plans before you start. For traceability in agricultural value chains to be viable, costs should be well estimated and covered in a modernised, sustainability-driven business model which is tailored to each type of value chain actor. Funding can also come from within the value chain through certain financial rewards (e.g. sustainability rewards).

It remains essential for any value chain actor to identify and leverage any opportunities for optimisation when incorporating traceability. In the envisaged ecosystem, the additional cost of extended traceability providing trustworthy product origin and environmental, social and governance data will only be a limited fraction of the added value of enhanced sustainability in the agricultural supply chain.

FAQ 10: What benefits can I expect from transitioning to traceability?

Increased interest in supply chain traceability

There has been a growing interest in supply chain traceability for (tropical) commodities over the last decade. Interests can be broadly categorised into:

- 1) Policy-driven requirements
- 2) Market-driven requirements
- 3) Supply chain efficiencies

National and international legislation and regulations, such as the planned EU regulation proposal on deforestation-free products¹¹, will require that importers (EU operators) conduct due diligence assessments of their supply chain to avoid deforestation. Traceability is therefore expected to become a minimum requirement for products to enter the EU market. The inability of certain trading actors to comply with such requirements will provide access to a larger market share for those who can.

Financial rewards for traceable and sustainable products

Markets can offer rewards for verified sustainable products. Traditionally this is related to voluntary sustainability standards through certification, which earns the holder a higher differential and a premium (to transfer or share with the producers). In some markets there is a focus on traceability as the foundation for any further sustainability ambitions. Traceable and trustworthy products are traded with significant financial rewards for their sustainability achievements. Cost-effectively implemented traceability systems are therefore worth investing in as the cost is only a fraction of the additional price for more sustainable products.

Further, implementing concepts such as “living income,” fair farmgate prices and premiums requires direct interaction with the producers. Succeeding in these will often significantly improve the reputation of the buying company in the producer communities and increase mutual loyalty. There has been a shift towards compliance with in-house developed labels through verification which offer more flexibility. Rewards can be based on smaller steps of compliance or only the level of transparency of origin. Specific buyers (may increasingly) link their sustainability funding to the achievement of specific environmental and/or social impact, based on their sustainability interests or commitments.

All of the above involves a transition from binary approaches (yes/no) in compliance with minimal sustainability standards towards detailed information on the sustainability

¹¹ https://ec.europa.eu/environment/publications/proposal-regulation-deforestation-free-products_en

characteristics of the products, with scores on a continuous scale towards relevant sustainability dimensions.

Risk mitigation through traceability

Risk management is also an increasingly important market driver. Issues, such as obscurities or lack of progress with respect to highly sensitive sustainability themes (including deforestation, biodiversity loss, child labour and other decent work infringements) put organisations and brands at risk of reputation loss. To avoid reputation loss, brands will have to map and understand their supply chains and obtain trustworthy information on whether and how such sustainability themes are addressed.

Increasing such visibility is a first step while further initiatives shall be undertaken or supported to reduce environmental and/or social harm and foster positive impact across the value chain. Brands being able to demonstrate genuine progress in the different dimensions of sustainability in their supply chains will not only reduce reputational risks but may also gain marketing opportunities. This means that brands will increasingly need supply chain partners that can provide sustainable products with detailed and trustworthy information – all of this backed by traceability practices and systems that are “fit for purpose.”

Traceability for both direct and indirect supply chains

In addition to the above, an appropriate **direct supply chain** must offer a range of benefits to all actors. Having producers and intermediaries identified with biodata (e.g. fingerprints, iris, etc.) capturing and using location data (geo-referenced plots or points of harvest) and volume potential analysis are possible methods to improve both the trustworthiness and efficiency of the supply chain, while still ensuring data protection and privacy. Appropriate supply chain mapping allows sourcing companies to plan their operations more efficiently and prior to the season.

As actors generate a track record over time, such information can be used to assess future investments in infrastructure or service delivery models (training, loans, agro-inputs, etc.). From the perspective of operational management, such business intelligence provides clarification and presents the chance to make well informed decisions. However, with contemporary traceability and sustainability requirements being increasingly applicable to the whole supply chain, it may be expected to also transform the **indirect supply chain**¹².

¹² Any sourcing of agricultural products outside a “direct supply chain” is categorised as “indirect supply”. A “direct supply chain”, supposes a relatively stable partnership and collaboration, in which the individual farmers/farming families are known (registered). Such partnership and collaboration may cover issues such as price, quality, good agricultural practices, social, human rights and environmental

This means new business opportunities for intermediaries, buying agents and traders that are capable of ensuring traceability and detailed sustainability information for agricultural products sourced and provided to the indirect supply chains of larger companies.

FAQ 11: What should I include in the contract with my provider?

You have received and selected a winning proposal based on your Request for Proposals. It is possible but rather unlikely that the content of this proposal corresponds exactly to your needs. Therefore, additional interactions are needed to discuss and clarify missing links and define the objectives of the solution.

Checklist of needs to be defined in contract

- ✓ Level of required customisation
- ✓ Staff availability
- ✓ Timeline of testing, review and improvements
- ✓ Development/customisation support

The **level of required customisation** of the traceability solution also needs to be clarified. For example, you will want to make sure that the traceability solution can be adapted to locally acceptable jargon, product types and units, and that these adjustments can be made in a user-friendly way. However, every traceability solution tends to have its own limitations which should be checked. Updated sketch boards and data flows can be referred to in the annex of your contract with the traceability solution provider.

Staff availability needs to be defined in the contract. It is too common that during acquisition prospective clients interact with a fully qualified and communicative representative, only to be presented with a significantly less qualified employee when the actual solution customisation and implementation work starts. It helps to have a verbal discussion with each key member of the traceability solution provider's staff that will be

issues, certification requirements, etc. This partnership and collaboration may be conducted through cooperatives, farmer organisations and/or other intermediaries embedded within the direct supply chain.

involved in your project prior to signing the contract to avoid language or other communication barriers.

In addition to the initial customisation of specific development work, there will be need for **tests, reviews and improvements**. Support teams of the traceability solution provider might want to restrict iterations in number or timeframe. Be careful to accept such restrictions as they might prevent you from acquiring a fully functioning solution. The process and costs for bug-fixing and/or sufficient level of customisation should be clearly defined.

Hidden costs can come up later in addition to the contracted budget as the traceability solution provider plans to train your staff on the ground, write an instruction manual, set up your server system in office, etc. Therefore, it is important to lay out such scenarios when planning, budgeting and contracting with your traceability solution provider.

FAQ 12: Data protection - how do I handle new regulations?

Since the introduction of the European Union General Data Protection Regulation (GDPR), there has been a sudden rush of attention on this topic by companies. The use of digital data collection tools (for traceability or other purposes) increases the amounts of data stored and consequently the responsibility to handle it. Even though many production countries in the global south may be lagging in strong legislation on data protection, there seems to be significant awareness on the theme amongst producers and other relevant actors. This is even more apparent when producers are asked to repeatedly provide their information to different organisations.

As a core minimum requirement, data providers should be informed about by whom, for what, and how the data will be used. It is necessary that potential data providers know that they have the right to not disclose the data if they do not want to. Respect for data ownership and ensuring that enhanced collection and processing of traceability data also benefits the farmers and their organisations, is key.

Field officers typically spend little time explaining all legal aspects to the respondent. More appropriate is the use of clear awareness messages in local language through videos or voice recordings which can be played in front of the respondent and explains their rights in clear terms. Digital tracking can be used to verify if the recording was displayed in presence of the farmer at a given time.

Fundamental data rights allow the respondent to access their data (online or in hardcopy), the possibility to edit the information as required and to delete it upon request. Doing so practically requires that a single dedicated officer acts as a point of contact to address any data related requests (see FAQ 22).

FAQ 13: How do I assure data quality?

Regarding data quality, automated control steps as well manual data validation processes are generally needed. Where applicable, a quality controller may review every single data point based on analytical parameters, experience, and understanding of local context. A direct relationship with the field staff can help to understand the realities on the ground as long as it does not compromise their neutrality. Such insight is generated by shadowing a field officer or by conducting control visits to verify previously collected data.

This control step is important for both relevant staff as well for the information management system (IMS) manager to improve performance of the system. There might be a need to add a **central quality review** step in the organisation. Surprisingly and quite often, this “second pair of eyes” still picks up many issues which passed undetected through the first step.

Quality assurance is a process of continuous improvement. Investment in staff capacity building and on-the-job coaching is critical to achieve the required level. Mistakes can be excused in the beginning stages, but compliance with set processes and data reliability should become the norm. To assist these processes, an **automatic data control and data validation mechanism** can be built into the traceability solution. Artificial intelligence can be used to flag potential incoherencies or contradictions and generate immediate requests to double check and confirm the provided data.

Using landscape approaches, multiple organisations can collect the same data points for the same actors or topics. Through innovative concepts such as “Zero Knowledge Proof”¹³ this data can be compared without disclosing the actual value, avoiding competitive disadvantages. One should expect continuous evolution and improvements in this field contributing to both data integrity and to cost-effectiveness of the traceability system.

It is essential to ensure that interests and **incentives are well-aligned** among all involved in the traceability system. If existing incentives or rewarding mechanisms can be (mis)used in a way that allows users to benefit from entering unreliable or wrong data, the probability that it will happen is significant.

Establishing multiple compliance control mechanisms may be costly and not really viable in the long run. This requires fair relations, with alignment of interests and incentives, where all benefit from efficient traceability and trustworthy sustainability information of the products entering the supply chain.

FAQ 14: How do I achieve credible traceability?

¹³ Zero knowledge proof or protocol is a way for a “prover” to convince a “verifier” that a statement about some secret information is true, without revealing the secret itself. The proof protocol may be interactive or non-interactive. For more details refer for example to: <https://doubleoctopus.com/security-wiki/protocol/zero-knowledge-proof/>.

Transparency and verification are the two keywords for credibility of traceability systems. It is crucial to have all processes, findings and resulting actions **documented** systematically. Some control mechanisms are often in place, but an appropriate control and assurance track record is often incomplete or missing. Such records are needed for assurance practices to be verified and certified by auditors or other independent third parties. The absolute minimum requirement is to have copies of internal audits filed in the internal management system of the relevant scheme.

External consultants are recruited solely in function of passing audits. Clear structures should be set to avoid extreme loads of paperwork and mismatches with the actual performance of the internal management system. Under the enhanced traceability and transparency systems, these challenges can be overcome by offering (authorised) stakeholders the ability to have **live access** to relevant value chain documentation at any time. Relevant datapoints for subsets of databases (linked to the products or batches sold to the respective client) can be shared while still limiting access to commercially sensitive information. Compared to audits which only occur once a year, such continuous and enhanced transparency can provide a more solid credibility to the sustainability schemes.

FAQ 15: How do I minimise assurance risks during actor-enrolment?

A typical risk during enrolment of new value chain actors is duplicate registration of the same individual. This can be prevented by linking ID codes to other **unique identifiers**, for example through a phone number or a national identity code (if such exists). Several countries are working towards **national databases** which could act as a foundation to the registration efforts of the various organisations. Manual review also allows duplicates to be detected.

Another risk is the registration of individuals who have no interest to supply or do not exist at all (ghosts). Such cases tend to occur when field staff is driven primarily by registration targets rather than business performance. This practice can be countered by letting each new registered user confirm their intent to be registered through **additional verification**, such as a photo of the national ID card, tracking time, date and location where registration took place, a photo of the individual on the registered farm and continuous monitoring of their participation in subsequent activities. Again, this should be done while respecting data privacy requirements (see FAQ 22 & FAQ 1).

FAQ 16: How do I assign identifiers to value chain actors?

Clear identification of value chain actors is a prerequisite to achieve traceability down the chain. Codes can be used as identifiers for each supply chain actor. Each code should be unique and follow a certain **syntax** or structure. Ideally a code should also be **meaningful** by representing a geographic area (KEN for Kenya) or actor category (A for Agent). Keeping the code short (e.g. F1234) while planning for future growth in numbers, categories, and geographical areas can be challenging (e.g. AFR-KEN-ELG-1234567-A). It is advisable to spend

some time figuring out a future-proof system and possibly include national or international standards if available.

When assigning individuals with their codes, it is important to also provide them with this information by writing the code down for each actor. This concept can be improved by printing a formal ID card with a unique barcode for fast identification for future interactions. Most producers will feel proud of receiving such a formal identity document and be able to more efficiently participate in multiple chains at the same time. Additionally, producers are often asked to participate and provide their data for socio-economic and other thematic surveys (e.g. academic research, macro analysis or policy information). Having a set of core data available will help to avoid data duplications.

FAQ 17: How do I map a supply chain?

As a start, attempt to map the sourcing relationships between all known actors in the different tiers upstream from the organisation. In this sourcing map, you can **categorise** by product and product type (raw, semi processed, processed), volume, certification and infrastructure. Implementing traceability solutions will require a customised approach for the various categories of supply chain actors.

It is not uncommon to see scepticism by suppliers at first. Thus, it can be useful to start with the most willing individuals first, develop a **success story** in a smaller (part of the) supply chain and then showcase this success to convince others. Using these “early adopter” suppliers as champions to convince others is an effective way of gradually transforming the value chain. This helps to avoid start-up difficulties that would affect all suppliers at once and offers the ability to learn from them. Planning, running, and evaluating such pilot implementations can easily take up a full season.

Some supply chains can be extremely complex and consist of many different intermediaries. It is often too ambitious to map all levels at once. Instead, have each supplier map their next tier completely and try to document transactions up to this level. Only when this works the next tier can be mapped again through a **step-by-step approach**. It is wise to **keep your intermediaries in the lead** on the engagement or at least fully informed on any direct interaction. The risk of feeling bypassed is high and might compromise the business relationship.

Organising specific awareness sessions at this level and/or enabling intermediaries to inform and motivate the value chain actors they source from will help to address any prevailing fears or doubts. It can take several upstream tiers until the actual producers are identified and well informed.

FAQ 18: What primary profile data needs to be collected?

The primary profile of producers aims to give a quick overview of ID data, location and contact details and production potential of an individual and their farm.



ID data

- Full name of the household head (in some cases also the spouse)
- Portrait photo of the individual
- Photo of their national ID card



Location data

- Based on formal administrative areas and zones
- Collected through field staff
- Geolocation of households and farms (*see FAQ 26*)



Contact data

- Phone contact for regular communication
- SMS updates
- Increasingly for payment purposes through mobile money services



Production data

- Ensures trustworthiness of claimed farm/plot origin
- Visit the farm and evaluate/compare the farm size and other aspects that define the production capacity (e.g. expected yield levels, etc.)
- Expect some variability and triangulate results with neighbouring farms and interview responses

Through the supply chain mapping, it becomes clear which supply chain actor (buying agent, intermediary, trader) purchases agricultural products from which producer. It is important to understand that supply chains are volatile, and a producer might be mapped as linked to buying agent X who is currently mapped to trader Y. However, next season, buying agent X might have decided to shift to trader Z.

It is essential that the traceability solution provides efficient ways to deal with such volatility. While supply chain mapping functionalities may be a useful feature of a traceability solution, this should not lead to bureaucratic problems or incapacity to document the real chain of custody when the sourcing stream (thus effective chain of custody for certain batches) is different to what was expected through a presumed supply chain map (*see FAQ 19*). Make sure that the producers also have access to their data and the right to deal with the data.

FAQ 19: What sustainability variables are important to track?

In the past, the market was merely interested in the quality and origin of a product and whether it complied with standards or labels. In line with ongoing trends toward increased sustainability and related due diligence requirements of supply chains, it is essential to capture, preserve and transmit a broad set of sustainability characteristics for agricultural products. This provides opportunities to acknowledge, reward and leverage sustainability characteristics that are neglected today¹⁴.

Sustainability themes are diverse and different actors tend to have different priorities. While a lot of data can be collected regarding these themes, it is important to capture only relevant and currently necessary sustainability information. Major trading companies have a **sustainable sourcing strategy** defining the sustainability principles they want to adhere to. Aligned with this is a **Code of Conduct** all upstream suppliers need to comply with. Further, sustainability ambitions can be visualised through a **Theory of Change** which shows how principles interact and influence supply chain actors. Defined indicators can help to specify how a principle should be measured. Lack of alignment with these will complicate making sustainability claims. It is also wise to refer to existing multi-stakeholder initiatives which usually have their own set of indicators already defined. When in doubt, engage with your supplier on what and how to measure.

A typical challenge is found between the need for alignment with **global indicators versus customisation** to regional realities on the ground. For example, a product yield expressed in kilograms of unprocessed volume per acre versus pounds of processed volume per hectare. Having the ability to customise such units separately for upstream and downstream interfaces will satisfy the preference of both user categories. However, this still requires significant sector-wide and cross-commodity **coordination and alignment** with regard to which sustainability-related and other characteristics to document and how to measure and aggregate this data. This falls under the challenge of content interoperability of traceability which is currently gaining significant attention and will be increasingly addressed in the coming years.

Overall, it is essential to be prepared to collect and incorporate additional sustainability information and other characteristics of the product that you produce, buy, process, transport and/or sell.

¹⁴ Some examples of sustainability achievements being neglected today: (1) farmers producing in line with sustainability standards or labels, but not being able to sell all of their compliant yield as certified (for example only 76% of compliant yield sold as certified with a certification premium); (2) sustainability achievements just below or way above the binary sustainability requirements of the label that are not captured or rewarded; (3) environmental and social improvements achieved through community efforts but not rewarded through the value chain.

FAQ 20: How do I limit disruption to the core business?

It must be acknowledged that implementing contemporary traceability involves adapting and sometimes transforming operations and business concepts and value chain relations. Supporting all stakeholders in the change process and avoiding undue disruption and confusion is thus key. It may be tempting to dive in with a comprehensive digital solution and rush the implementation of digital conversion as soon as possible. However premature roll-out and implementation will most likely lead to confusion and disruption with an immediate negative effect on stakeholder trust, commitment and morale.

Checklist for limiting disruption of core business

- ✓ Ensure Proof of Concept
- ✓ Pilot minimum viable product
- ✓ Run pilot version in parallel with the existing data flow
- ✓ Stakeholder Communication

A more considerate and gradual approach can avoid disruptions to your business operations. A **Proof of Concept** is needed before rushing into implementation. An important part of the preparation can be based on a hardcopy paper trail and documentation of all relevant transaction and processing steps (including used documents).

It is essential to plan a detailed mapping of existing practices and then simulate the new process flow. This information can be tracked into a spreadsheet which is updated regularly by a data clerk to replicate the Chain of Custody steps. Running this for a few days continuously for all given scenarios provides a very fast understanding on what existing functionalities the traceability solution is expected to cover. It is much easier to make corrections to a simulation using a spreadsheet than it will be to an already rolled-out traceability system. Obtaining a proof 'Proof of Concept' generally requires iteration processes between conceiving the concept and piloting it in a test environment. After simulating the core design group, testing in a parallel setting with real stakeholders is essential.

Referring back to the prioritised functions of your traceability solution, you will see that these can be grouped into clusters. Within the traceability solution these will likely take the form of modules which are used by particular users for particular purposes. Typical modules can cover:

- 1) Registration of actors
- 2) Geo-mapping
- 3) Purchase of agricultural products
- 4) Processing the agricultural products
- 5) Audits & export, etc.

Each of these modules should be piloted as **minimum viable product (MVP)**. MVP's offer just the core functionality without any secondary benefits, nice polishing or extras. Disruption can be minimised by **running this first pilot version in parallel** with the existing data flow in the organisation. The traceability solution should only be integrated into the core operations of the organisation once pilot versions for a given module have been reviewed, tested for all given circumstances, and considered perfect.

Keeping the former (hard-copy or less developed) system running for a bit longer is definitely advised from a continuity assurance perspective. Particular risks are encountered when subsequent updates to the traceability solution take place or when onboarding to additional modules of the selected traceability solution. It is essential to clearly **communicate** the testing processes to all stakeholders to ensure continuous support for the entire process and accept the adaptation efforts that come with any changes.

FAQ 21: How long will the transformation take?

A clear time estimation for the transformation to a (digital) traceability solution is difficult to make. A **pilot phase with each minimal viable product (MVP)** will likely consist of both desktop review and field review by selected ultimate users included in the pilot testing team. The sooner the end-users are provided with the opportunity to give feedback, the more efficient the improvement cycle will run. It is common to see that the first version can be reviewed with relevant feedback in just a day. Later versions might need up to one or two weeks of field testing to explore all different scenarios encountered.

Typically, a pilot phase can take between four to seven iterations before functioning as intended. The efficiency (and fun) of these cycles will highly depend on the support team to understanding the user side of it and the users knowing what they expect in advance. With several modules to be customised through multiple iterations it becomes clear that implementation is not a matter of weeks but often months. Progressing to more advanced levels of traceability or progressively adding new modules to the system can take up several years.

As you move along during implementation, you need to be aware of **scope creep**, with people tending to add particular wishes as you go. Try to stick to the list of priorities unless it is absolutely clear that something fundamental was lacking when priorities were initially set.

Make sure to record new demands and respond to these in a next system development round. Good, future-proof traceability solutions are flexible and allow for activation of additional features, data fields, etc. when they are needed. Particular attention needs to go to the aspect of absorption capacity of less digitally literate supply chain actors.

Rather than expecting a complete transformation with all modules at once, it would be wise to spread the ambition out over multiple sourcing seasons. This is especially recommended when the digital data collection occurs in parallel with the old-fashioned paper trails and creates extra workload. It is wise to plan conservatively and include a buffer period for unintended technical hiccups. Having a plan B in place (yes, back to pen & paper) will help to avoid the stress resulting from derailed implementation plans. Nonetheless, such risks can be minimised through proper piloting.

FAQ 22: How do I get my suppliers to participate?

Farmers and producer organisations are at the core of every agricultural value chain. Therefore, motivating farmers, cooperatives, and other farmer-based organisations to integrate sustainability data collection and traceability solutions into their operations is key. Assuming that suppliers have been included in the stakeholder process described above and their fears have been addressed, it is time to talk business: “What is in it for me?”

The most important and expected benefit is a price increase (spot and premium) and the resulting payment rise. At the producer and intermediary level, incentives should compensate the extra time spent on training, registration, audits, segregated handling and documentation of supply chain transactions. Furthermore, an end-of-season bonus (premium) is often paid for following certain production processes or certification schemes. **Service Delivery Models** can be applied to offer alternative incentives and added value to producers, which will help attract suppliers. These can be agro-input advances, training, individual coaching or more social projects in the community.

Despite such investments, reality shows that producers’ loyalty still primarily depends on spot price paid. A new incentive is the generation of a historical track record on production, sales and other social variables. Such datasets not only hold value for the company itself but also for financial institutions in screening loan applicants credit worthiness. Participating in a traceable value chain can then allow producers to access financial services more easily. In addition, sustainable value chains with contemporary traceability can also be used to attract impact-based funding.

After achieving a mutual understanding, it can be further defined into an **agreement** (MoU or contract) stating the responsibilities of both parties. Typically, such documents help define the Chain of Custody model, documentation requirements, quality requirements, willingness to participate in verification activities, the direct benefits (premiums, price, rewards for trustworthy data, sustainability achievements, etc.), offered services (asset financing, etc.) and

supporting activities to help compliance (training, audit). Through such agreements, producer and producer organisations' capacities are strengthened and a further focus is put on (enhanced) sustainability demands which can be taught and implemented through **awareness trainings** in:



Furthermore, farmers and their organisations expect enhanced traceability to benefit them in several ways:

- 1) More rewards and incentives for farmers' efforts, resulting in improving sustainability and quality of produce
- 2) Increased assurance of effectively being paid a fair price
- 3) Better access to finance
- 4) Further farmer empowerment, including for sustainability data and achievements, within a transparent agricultural value chain

Farmer-level participation in traceability systems should in no way harm or threaten their personal, economic or financial interests. On the contrary, collecting, managing and sharing their data for extensive traceability should empower and benefit farmers and their producer organisations in the short, medium and long term. Effectively valuing sustainability efforts and achievements of farming households, their communities and organisations is key. **Intermediaries** should equally be given training and (financial) incentives to participate in (digital) traceable supply chains.

The concept of **feedback loops** is important as these can provide producer organisations with benchmarking information and valuable insights from analysing their own data related to broader trends in the relevant sector (see FAQ 24).

FAQ 23: How do I plan my analytics and reporting efficiently?

Collecting reliable data on value chain actors, products and areas is only worth something if the resulting information is made available in a meaningful way. A first consideration is that different stakeholders will need different data points organised in different ways (units, aggregation level, time frame, topic, segment of the chain, etc.).

A specific stakeholder consultation on their needs will allow you to convert the data into useful information for each respective use case. For example, the sourcing manager will wish to know the current value of raw agricultural products in stock per product category for a specific buying point. The director will wish to know the total volume of processed produce ready for a particular client. The client will want to know what percentage of the latest container is sourced from farmers who achieved the Living Income benchmark. A multi-stakeholder initiative will want to know how the aggregated sustainability score related to their definition of the environmental dimension, including halting deforestation (forest preservation and reforestation) performed in the previous year.

Satisfying all these heterogeneous expectations requires the traceability solution provider to offer **flexibility** in data analytics as well as report generation. Offering the ability to the different users (*see FAQ 5*) to develop custom dashboards takes away dependency on external customisation teams (and even from the systems admin).

While not all traceability solution providers offer such advanced features, there is almost unlimited potential by creating database links with external analytical software such as Tableau, Power BI, etc. Data analytics can be automated which contributes to its final consistency and stakeholders can be given online access to the relevant dashboards at any given time while even offering some ability to further explore and filter for their particular case of interest.

FAQ 24: How do I create feedback loops to suppliers and smallholders?

A structural process that also **benefits** the farm-level stakeholders is required for quality data collection. An easy step is to take time to provide guidance to the producer on what they can improve. Such guidance can turn into a small personalised agricultural training. Alternatively, explore options on how to address non-compliance with a particular standard or prepare to benefit from opportunities for sustainability impact-based funding.

Such feedback could already be recorded (manually) in an improvement plan kept by the producer. The use of mobile printers now also offers the ability to print reports and support materials. This is particularly important for written acknowledgement that the data is correctly collected. The use of (several) SMS to share key data points and insights represents another technology that can be used for documentation and transfer purposes.

A more innovative approach uses peer-to-peer comparison to let an individual household compare their performance (e.g., yield) with others. Personalised print-offs designed with respect to users with limited literacy can highlight the household situation in comparison to their nearest group members. The facilitation of such group discussions can be extremely rewarding to explore what makes a certain farm more productive than others and what can be done to uplift others to the same level.

Contemporary traceability and supply chain due diligence will increasingly require collection of ample environmental, social and supply chain governance data related to the plot, the agricultural production, the farm, the farming household, the community, the agricultural production area, etc. From a perspective of fairness in the value chain, it is essential that the **data collected through traceability is also analysed** through a perspective of generating meaningful feedback to farmers, farmer organisations and agricultural production units. How do they perform vis-à-vis international trends? How are their sustainability achievements being leveraged on the market and do they benefit sufficiently themselves? What good practices are observed elsewhere and are specifically appropriate for certain farmers, farmer communities, etc.? What additional progress in their sustainability characteristics could further enhance the product value?

It is also possible to use artificial intelligence in the analysis in order to generate concrete and tailored recommendations to farmers, cooperatives and communities. Furthermore, traceable value chains should facilitate connection between producers and sustainability impact-driven funding and long-term investments.

FAQ 25: Is blockchain technology for my solution necessary?

Blockchain technology presents a great basis for digital traceability. Nevertheless, its complex nature and dependency on data consistency and internet connectivity currently contrasts with most of the working environment at the origin of tropical products. In many of the origin countries, the availability of basic export statistics, supplier identities and production potential are only now being defined with some reliability. As such, the context of tropical agricultural value chains is not yet conducive for blockchain-enabled technologies. However, as both the prevailing context and blockchain technologies are continuously evolving, the potential should also not be discarded.

For supply chains, the transparency ensured through blockchain technology can help to build consensus on the journey of a specific batch of products. Once individual actors and product batches are identified and connected to a blockchain address, every interaction between supply chain actors, or between actors and verifiers, can be confirmed by both sides. Blockchains function as a non-partisan layer between supply chain actors so they can safely interact and share data or values.

“Blockchain technology is a novel way of storing data and information in a tamper-proof way. A blockchain is essentially a database in which transactions are stored in a continuously growing chain of data blocks. With the help of cryptographic processes, a high level of data security and transparency is achieved. Transactions can be any type of information, such as financial transactions, contracts, shares or land register entries. Blockchain technology can help make supply chains traceable, administrative processes more transparent and thus more efficient, or the use of financial resources traceable and thus reduce corruption.”

Blockchain Technology (Toolkit Digitalisierung (2022). Available at: <https://toolkit-digitalisierung.de/en/blockchain-partnerships/>).

Of course, there are situations in which supply chain actors only want to share certain information with certain supply chain partners. Smart contracts, decentralised file storage and other encryption technologies offer supply chain actors several possibilities to stay in full control of their data. By using zero-knowledge proofs (which, unlike smart contracts and decentralised file storage systems, do not rely on blockchain technology to function), actors can even validate the integrity of certain data fields to others, without making their entire data set transparent.

FAQ 26: Does traceability require geo-mapping of farming plots?

A clear identification of the ‘origin’ of the agricultural product, up to the farm level, including its georeferencing, is generally understood to be a minimal requirement of contemporary traceability.

The traceability strategy and roadmap of the country/sector/value chain actors shall set the ambitions with respect to geo-referencing and geo-mapping of farms and plots, agricultural producing areas, warehouses, processing units, etc. Key policy decisions need to be made on whether the sector engages in a detailed mapping of farming plots, or whether alternative/complementary approaches to trustworthy geo-referencing will be employed. Each batch of harvested agricultural product shall have a clear geo-reference. However, there are still important choices to be made on how to proceed. The following aspects are to be considered:

- 1) As single farmers may have multiple plots, farms or concessions, the geographic reference needs to relate to the product, not to the farmer.
- 2) Detailed geo-mapping of farming plots and batches of harvested products entering the supply chain to the (previously mapped) farming plots where they were produced is the traditional approach. However, the most suitable approach might vary for different countries or contexts.

- a) Plot mapping initiatives and programmes seems to often be confronted with recurring underestimation of efforts and time needed to conduct, complete, maintain and update trustworthy detailed geo-mapping of farms and farming plots.
 - b) Experience also shows that difficulties in plot mapping multiply when it is extended beyond the longer established “direct” supply chains. For example, hurdles relating to land rights discussions, disputed concessions, etc. often hamper further roll-out of plot mapping.
 - c) The volatility in relations between plots, farmers, farms, crops, plot use, etc. are often underestimated. Embedded and low-cost mechanisms for continuous updating of the plot-mapping databases are often lacking and the data can quickly become outdated and unreliable.
 - d) Even if the plot mapping is perfect, the linking of a harvested product to a previously mapped plot remains a delicate step. At this stage, the traceability system should avoid/block attempts to link products from other (unmapped) origin to mapped plots.
- 3) Detailed geo-mapping of plots can serve multiple, mutually reinforcing objectives, including securing land use rights of farmers, transforming sharecroppers in smallholder farmers, using drones to generate geo-referenced agri-analytics and advice, etc. Successful geo-mapping initiatives require area-based approaches, proper assessment and confirmation of their local-level feasibility and embedment and embedded mechanisms for continuous maintenance and updating with involvement of key local value chain actors. Therefore, it must be acknowledged that generalised geo-mapping of plots could be time consuming.
- 4) In absence of prior plot mapping, **geo-referencing the point of harvest** may be a just as effective (or even more effective) means of verification.
- a) The batch of the harvested product is to be provided a “geo-stamp” and a “time-stamp.” This can be combined with multi-actor collection/confirmation of environmental, social and governance data, photos at time of harvest, financial and other transactional traceability and cross referencing with geo-mapping of all types of forests, including forest preservation and restoration initiatives and their targets.
 - b) Sufficiently granular georeferencing of points of harvesting – appropriately linked to batches of agricultural products – can also be used for geo-based visualisation of farming, overlaying with forest mapping and plotting of changes in forest coverage in (equally mapped and tracked) agricultural production areas.
- 5) It is important to onboard the producer organisations to be part of the mapping process and make sure they benefit of having their plots mapped. This goes along with training on using GPS devices and geoinformation systems. Lacking digital infrastructure could be a

challenge here. However, smartphones generally tend to have a GPS module and can also be used for geodata collection.

8. Annexes

Annex 1 – Workflow checklist on the Implementation Guide

| Workflow checklist on the Implementation Guide | | | |
|---|---------------------|--|---|
| Chapter | Process type | Steps | Checks |
| FAQ 1&2 | Reflection | Clarify the objective of traceability and requirements of a solution | |
| | | .. | Scope |
| | | .. | Commodities |
| | | .. | Chain of Custody system |
| | | .. | Actors in supply chain segment |
| FAQ 3 | Internal action | Conduct stakeholder consultation | |
| | | .. | Create awareness |
| | | .. | Assess and align values |
| | | .. | Consult on expectations |
| | | .. | Understand doubts & fears |
| | | .. | Assess internal capacity |
| | | .. | Select change agents |
| | | .. | Ensure leadership commitment |
| | | .. | Offer influence |
| FAQ 4&5 | Internal action | Assemble background information | |
| | | .. | Describe information management systems used |
| | | .. | Sketch story boards |
| | | .. | Simulate data flow in a visualisation |
| | | .. | Describe ideal solution and features |
| | | .. | Define user matrix with respective role & authority |
| FAQ 6 | Internal action | Describe needs in a Request for Proposals | |
| | | .. | Differentiate 'Nice to have' versus 'Need to have' |
| | | .. | Share background information |
| | | .. | Share user matrix |
| | | .. | Share data flow and relevant examples of records |

| Workflow checklist on the Implementation Guide | | | |
|---|---------------------|---|---|
| Chapter | Process type | Steps | Checks |
| | | .. | Share a template to respond |
| FAQ 7 | | Select offers by traceability service providers | |
| | | .. | Understand customisation required |
| | | .. | Understand cost structure and implications |
| | | .. | Conduct reference check |
| | | .. | Assess adherence to the principles of Human Centred Design |
| FAQ 8 | | Assess cost implications of traceability | |
| | | .. | Data collection tools |
| | | .. | Server/hosting fees |
| | | .. | Management time |
| | | .. | Stakeholder consultations |
| | | .. | Staff trainings |
| | | .. | Partner trainings |
| | | .. | Differentiate fixed start-up costs vs recurring operational costs |
| FAQ 9&10 | | Assess added value of traceability | |
| | | .. | Market assessment on value of traceability information |
| | | .. | Draft a business plan |
| | | .. | Have an exit strategy after grant funding |
| FAQ 11 | | .. | Explore secondary opportunities using traceability data |
| | | Design a contract with the traceability solution provider | |
| | | .. | Define customisation requirements |
| | | .. | Define staff selected |
| | | .. | Define time for testing & review |
| FAQ 12 | | Review data protection requirements | |
| | | .. | Update data policy |
| | | .. | Dedicate data protection officer |

| Workflow checklist on the Implementation Guide | | | |
|---|---------------------|---|---|
| Chapter | Process type | Steps | Checks |
| | | .. | Develop appropriate awareness messages towards data providers |
| | | .. | Train staff on data protection implications |
| FAQ 13&14 | | Create assurance and transparency on data quality | |
| | | .. | Develop a quality assurance policy |
| | | .. | Dedicate a data quality officer |
| | | .. | Include automated verification features |
| | | .. | Set up a documentation system |
| | | .. | Conduct manual verification exercises |
| | | .. | Review staff incentives aligned towards data integrity |
| | | .. | Offer clients access to live data through appropriate interface |
| FAQ 15&16 | | Codes are assigned in a structured way | |
| | | .. | Code syntax represent meaningful characteristics |
| | | .. | Unique identifiers used |
| | | .. | Alignment with national databases |
| | | .. | Additional verification by individuals |
| | | .. | Time & geo-stamping |
| FAQ 18 | | Collect relevant data from suppliers | |
| | | .. | Review client's Theory of Change |
| | | .. | Harmonise with global sustainability KPIs |
| FAQ 17&19 | | Pilot the traceability solution | |
| | | .. | Start with a pilot by most willing suppliers |
| | | .. | Follow a multi-step & cascading approach |
| | | .. | Simulate paper trail |
| | | .. | Pilot traceability solution in parallel with the existing data flow |
| | | .. | Split pilot in phases per Minimum Viable Product |

| Workflow checklist on the Implementation Guide | | | |
|--|--------------|---------------------------------|--|
| Chapter | Process type | Steps | Checks |
| | | .. | Keep stakeholders in the loop |
| FAQ 21&22 | | Create ownership with suppliers | |
| | | .. | Create awareness on specific benefits from traceability data |
| | | .. | Assess potential negative effects 'Do no harm' principle |
| | | .. | Consult stakeholders on how data is needed |
| | | .. | Design feedback loops to data providers |

Annex 2 – Quick overview of the Principles for Digital Development

A clear identification of the 'origin' of the agricultural product, up to the farm level including its georeferencing, is generally understood to be a minimal requirement of contemporary traceability.

- 1) Incorporate multiple user types and stakeholders in each phase of the project lifecycle to direct feature needs and revise the design. Here, users are people who will interact directly with the tool or system, and stakeholders are people who will be affected by or have an interest in the tool or system, such as people whose data is being collected, government officials or researchers who may study the data collected.
- 2) Design tools that improve users' current processes, saving time, using fewer resources and improving quality.
- 3) Develop context-appropriate tools informed by users' priorities and needs, considering the ecosystem and accepting that digital tools will not always be the best fit.
- 4) Develop the tool in an incremental and iterative manner, with clear objectives and purpose in mind.
- 5) Ensure that the design is sensitive to and considers the needs of the traditionally underserved.
- 6) Embrace an iterative process that allows for incorporating feedback and adapting your tool after the initial testing and launch.
- 7) Be open about setting expectations and let people opt out of participating in the design process.

For more details: Principles for Digital Development,
<https://digitalprinciples.org/principle/design-with-the-user/>
(Accessed: July 12th, 2022).

Imprint

Published by:

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
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Digital publication only
Bonn, October 2022

On behalf of



Federal Ministry
for Economic Cooperation
and Development

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