Delta Framework

Integrating new performance indicators into sustainability systems: practical considerations

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Delta Framework

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1 The four Delta Project partners are: Better Cotton, the Global Coffee Platform (GCP), the International Coffee Organisation (ICO) and the International Cotton Advisory Committee (ICAC).

Contents

1. Framing

The Delta Framework provides a set of 15 impact and outcome indicators to measure sustainability improvements within and across the cotton and the coffee sectors. In order to promote a globally harmonised approach for reporting sustainability results, the Delta Framework has a strong alignment with the Sustainable Development Goals (SDGs).

The Delta Framework comprises a set of guiding documents to integrate the indicators into existing monitoring systems, to collect and analyse data, and to properly communicate sustainability improvements.

These guidelines are available on the Delta Project website and include:

1. **Delta Framework Sustainability Indicators.** This document presents the set of 15 indicators, the rationale for their selection, definitions, methodological notes, and main references for each indicator. It also includes the learnings from pilot testing the indicators in different countries and settings.
2. **Integrating new performance indicators into sustainability systems: practical considerations.** This document includes considerations and a set of guiding questions designed to support the inclusion of the indicators in the Monitoring, Evaluation and Learning (MEL) systems of Voluntary Sustainability Standards (VSS) and other organisations;
3. **Basic guidance for obtaining informed consent for the Delta Framework indicators data collection.** This document guides the incorporation of informed consent for the Delta Framework indicators data collection into existing organisational data strategy and policies;
4. **Description of a common data model for the Delta Framework indicators.** This document supports the implementation of common data models to facilitate future data aggregation and collective reporting;
5. **Principles to define and communicate sustainability performance in the agricultural commodity sector.** This document directs public and private sector stakeholders on deriving sustainability information and messages on the production of agricultural commodities from the data.
6. **Guidance and tool to aggregate producer-level sustainability data and report progress at national level.** This methodology aims to support national commodity associations and other relevant public bodies to aggregate producer-level data using the Delta indicators to assess the sustainability performance of the commodity's production at country level.

Delta Framework

Delta Framework Sustainability Indicators

- Indicators description
- Definitions
- Methodologies
- References
- Learnings from pilot testing the indicators

Integrating new performance indicators into sustainability systems: practical considerations

- Strategic framing for indicator integration process
- Data value chain
- Generation: data capture, acquisition, and obtaining informed consent
- Data transmission and validation
- Analytics: data processing and analysis
- Exchange: packaging and communicating insights, publishing, and sharing data

Basic guidance for obtaining Informed consent for Delta Framework indicator data collection

- Data protection and the categorisation of personal and sensitive data
- Recommendations for how to obtain informed consent

Description of a common data model for the Delta Framework indicators

- Overview of the information and data ecosystem
- Applying a common data model
- Mandatory data
- Application of existing data standards
- Ethical and data protection considerations
- Recommendations for how to apply the common reference data tables

Principles to define and communicate sustainability performance in the agricultural commodity sector

- Monitoring versus impact indicators
- Framework application principles
- Indicators-specific principles
- Data collection principles

Guidance and tool to aggregate producer-level sustainability data and report progress at national level

- Aggregate producer-level data
- Report sustainability progress at national level

2. Key definitions

Accuracy is how close or far off a given set of measurements are to their true value.

Data governance is the compilation of activities and policies designed to inform the extent of confidence in data management and data use. Data management and data use are not considered individually or separately from each other. Both data management and data use are intertwined parts of an organisation, across applications and indeed across the world.

Data infrastructure is a collection of data assets, the organisations that operate and maintain them, and the policies and guides that explain how to use and manage the collected data. It can be viewed as the ecosystem of technology, processes and actors/organisations needed for the collection, storage, maintenance, distribution, and reuse of data by the different end-users in the data ecosystem.

Data subject is the technical term for the individual whom data is about.

Data user is any person involved in accessing or utilising data sets for analytical purposes or deriving insights.

Data value chain is the processes of data creation and use from first identifying a need for data to its final use and possible reuse. Like other value chains it breaks down the processes into subsystems, each involving inputs and outputs. For the purposes of this resource, a four-stage data value chain is described. The four stages are data generation, transmission and validation, analytics, and exchange.

Indicator is a calculated measure of performance consisting of one or more metrics.

Metric is the basic variable that is measured, whether through the assurance process or within a monitoring and evaluation process.

Precision is how close or dispersed the measurements are to each other.

Taxonomy is the classification of data into categories and sub-categories. It provides a unified view of the data in an organisation and introduces common terminologies and semantics across multiple systems.

Use case is a definition of a specific business objective that the data system needs to accomplish. A use-case will define this process by describing the various external actors (or entities) that exist outside of the system, together with the specific interactions they have with the system in the accomplishment of the business objective.

3. Introduction

This document is for people interested in integrating new performance indicators into existing monitoring and evaluation, assurance, and verification processes of sustainability systems. Indicator integration is the process through which indicators and their respective methods are tested and refined, and an organisation prepares for incorporating the resulting new data into existing data systems, policies, and reporting processes to generate valuable new insights. To do this an organisation must consider adjustments to the indicators and systems, prepare training and materials, and build data governance procedures and policies.

The considerations presented in this document are based on best practice and lessons learned from a variety of ISEAL projects and community member experiences (see Appendix 1).

3.1 Purpose

Through outlining a series of practical questions and considerations in a modified checklist format, this document can help sustainability systems anticipate challenges and assist in avoiding unforeseen complications when preparing to integrate new indicators. The questions and considerations are intended to help identify and reduce potential financial, system design, and other risks and inform strategies to mitigate these risks as part of an overall indicator integration process. The document can also be used as a framework for tracking progress of the integration activities.

IMPORTANT: The starting point for this document is that indicators have already been selected [1].

3.2 Target audience

The primary audience for this document is Monitoring and Evaluation (M&E) practitioners. However, due to the strategic significance and information system design implications associated with indicator integration, the document includes content that is also relevant for organisational leadership and information and technology (ICT) specialists. It is anticipated that the considerations presented can help orient all stakeholders to the primary issues to think about when planning to implement new indicators.

[1] For an overview of defining what and how to measure see Appendices 2-4.

3.3 How this document is organised

This document includes the following sections:

- It begins with an outline of expected challenges encountered in indicator integration. Many of these are familiar concerns for any change management process.
- This is followed by strategic framing requirements for the process, including identifying and ensuring that appropriate governance, procedures, and resources are in place to initiate indicator integration activities.
- Next the concept of the 'data value chain' is introduced and used to break down the data journey into four stages - generation, transmission & validation, analytics, and communication & exchange. At each stage, the associated inputs and outputs need to be assessed for quality and feasibility implications.
- The conclusions section summarises high-level insights and recommendations.

As relevant, each section first orients the user to expected outputs, then outlines key considerations as well as detailed questions that can support planning activities to produce those outputs.

? Questions are indicated with a ? symbol.

3.4 How to use this document

This guide and set of step-by-step considerations are designed to support planning and workflow for the integration process. It provides a logical sequence of stages for actively planning and managing the integration process. It can be useful for:

- Guiding estimates of the effort and costs associated with integrating new performance measurement indicators that can inform budget development and fundraising.
- Initiating the process itself, to ensure that all relevant aspects of indicator integration have been considered and that people, processes, and resources are in place.
- Revising plans during the process. As challenges and opportunities are encountered, the framework provided serves as a roadmap to orient users and document adjustments.
- Making and documenting final decisions for data capture, management, use, sharing, and archiving processes for the new indicators.

While the considerations are presented stepwise, the integration process is iterative[2] (Figure 1). The document framing presumes that there will be a series of agile pilot activities throughout the integration process that afford adjustments to collection methods and analytical approaches where challenges or opportunities for improvement are identified. The selection of different indicators may also be necessary if it is found that a particular indicator is unfeasible to collect or does not serve its purpose for insight generation.

[2] For template tools to guide assessment and indictor development as part of the iterative process see Appendix 5.

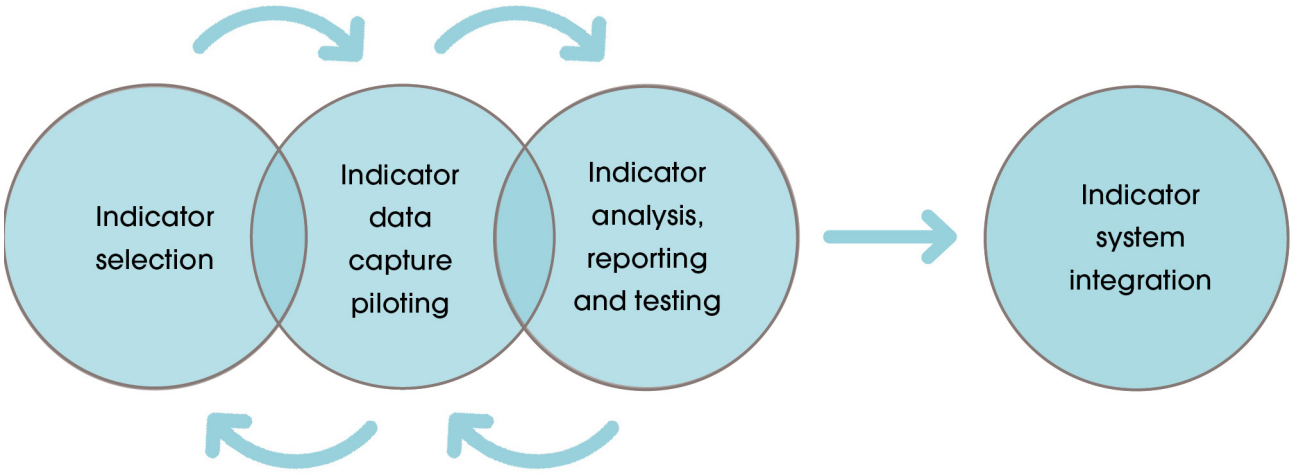

Figure 1. Process-based stages towards indicator integration. Each stage is iterative in and of itself, and stages may need to be retraced to make appropriate adjustments. For example, if indicator data capture piloting is unsuccessful, selecting a different indicator may be necessary.

Activities to test and integrate indicators should be consultative and participatory from the outset. Including a team with complementary skills and backgrounds, and individuals that can immediately assume responsibility, accelerates establishing the required buy-in and coordination.

4. Common issues when integrating a new indicator

Below are a series of common challenges that organisations come up against when attempting to integrate new indicators. It is useful to be aware of and think about them as a preface to developing your overall strategy.

- **Culture** – Resistance to change, low data literacy of key staff, and unresponsive stakeholders.
- **Stakeholder pushback** – Reluctance of stakeholders to collect or provide additional data for various reasons (e.g., survey fatigue and data privacy concerns).
- **Capacity** – Lack of financial, technological, and human resources.
- **Skills** – Limited people with the right skill sets or technical expertise to guide data collection, analysis, and interpretation for specific thematic issues (e.g., gender, labour, water, climate) within the organisation and implementing partners.
- **Time** – Insufficient organisational prioritisation of time to go through an extended indicator integration process.
- **Preparing and implementing training requirements** – Ensuring that there is sufficient understanding of protocols, tools, and systems to enable effective data collection, processing, and analysis, and sufficient data literacy to interpret and use data (both within the organisation and implementing partners).
- **Technology** – Addressing required adjustments to IT architecture, accounting for cross-department integration and data silos, or updates to legacy systems.
- **Adjustment to data governance**[3] – Modifying registries, quality control protocols, consent / use rights and other data governance policies and procedures so that data is being properly recorded, classified, and formatted so that it can be shared and re-used.

[3] As governance policies are updated, it is necessary to review and understand the legal and regulatory requirements of relevant jurisdictions where data collection occurs. Any internal adjustments or data system change processes are easier when sustainability systems have established and clearly defined data governance mechanisms and policies in place.

5. Strategic framing for the indicator integration process

As there will likely be several challenges to overcome, the process of integration can take time. It is therefore important that an organisation is clear about what it sets out to achieve through the integration of a new indicator (use case) and has thought through what will be required to prepare and resource those activities (context, starting point, and capacity).

The first action an organisation should take is to strategically frame integration activities. This involves identifying and ensuring that appropriate governance, procedures, and resources are in place to initiate indicator integration activities. The organisation should aim to:

- Define the objectives and scope of an integration initiative. (Use case and context)
- Assess the resources and capacity required. (Context, starting point, and capacity)
- Establish project teams.
- Establish and implement a communications plan.

Strategic framing should involve all relevant functional units within an organisation (e.g., marketing, communications, programmes, monitoring and evaluation, assurance, operations) to strengthen participation. It also should include any actors who will need to be involved in planning, testing, and scaling up an indicator (e.g., data subjects or producers, field enumerators, certification bodies, information and technology designers, subject experts). Strategic framing discussions should aim to prepare two primary outputs:

1. **A high-level summary of the available resources and considerations.** This summary should be validated with key decision-makers, such as business unit managers, relevant field staff, and other key decision-makers.
2. **A clear organisational strategy that defines stakeholders and data usage objectives** for the integration process. There should be a consensus on the objectives.

These outputs should be referred to during later stages of integration to support decision-making and adjustments to the approach. For example, you may discover that your designated enumerators do not have sufficient capacity to undertake data capture for the indicator, or that targeted users of the performance indicator results require information in a different format or frequency than initially understood. Establishing a broad understanding of the proposed plan through organisational communication channels will help build awareness and facilitate buy-in from key stakeholders and team members.

5.1 Define objectives and scope for the indicator integration initiative: Establishing the use case and context

To manage expectations and coordination among the different stakeholders, it is best to collaboratively define the objectives (use case) for integrating the indicators and scope (context) of the integration process. Resurfacing decisions made during indicator selection[4] will help guide this framing. It is particularly useful to revisit and be clear about:

- How the various internal and external stakeholders want/need to receive indicator information.
- How the indicator information is best communicated/shared with each stakeholder group.
- How frequently the indicator information is needed by each stakeholder group.

Stating objectives for integrating the new indicator(s) sets clear expectations for the results of the integration process. The objectives specify what your system will be able to do once the new indicators are fully integrated into your system. Possible examples include:

- 90 percent of certificate holders are receiving tailored annual performance reports that allow them to credibly communicate their sustainability results to other supply chain actors.
- Organisations can monitor water stress across 100 percent of producers and effectively allocate resources for water management support based on need.
- X number of supply chain actors are receiving annual reports detailing performance by geographic area, sector, or sustainability theme.

Defining the scope (or context) for the integration process involves establishing which aspects of your operations and business model the indicator(s) will address and when. Questions to reflect on when defining scope include:

- **?** Are the indicators relevant to only specific operational contexts (e.g., geographies, activities, or commodities)?
- **?** If you intended to measure the indicator for a subset of your portfolio, is this subset clearly defined and adequately distinguished by your system?
- **?** What is the timeframe for the overall integration process and what is your anticipated rate of progress?
- **?** What is the strategy and timeline for meeting different stakeholder information needs? Is there a priority audience for the performance results that will be addressed first, second, and so on?

As with all strategic initiatives, it is important to identify both critical assumptions and potential risks:

[4] See Appendix 2 on indicator selection

- **Identify critical assumptions.** An example assumption might be that you can identify and contract the requisite IT skill sets, or that the data collectors will receive training by x time. Listing out the critical assumptions will allow you to inform key stakeholders of the primary resource needs and their timing, providing quick insight into where the biggest risk factors lie.
- **Identify potential risks** and assess the likelihood of occurrence. This will allow for the development of approaches to manage those risks if they occur. Generally, the top three risks will be constraints on time, money, and scope, but there are likely other constraints like data literacy or cross-organisational coordination requirements that warrant attention.

5.2 Assess resources and capacity required: establishing the starting point and capacity

Although at this stage, you do not have all the information on resourcing requirements, it is important to generate an initial understanding of what resources are expected and available to support the indicator integration initiative. Indicator integration will most likely build on existing systems and capacities for data capture, collection, analysis, reporting and exchange.

To estimate resource requirements, it is best to first review costs associated with existing indicators the organisation currently collects and reports. Because you are integrating the new indicator(s) into your current system, having a solid accounting of the costs for implementing existing indicators in your system is a good frame of reference.

Your goal at this stage is to develop a clear understanding of what financial resources are directly and indirectly available or that you anticipate needing. In addition to financial capacity (the funds determined by your budget and ability to raise funds for this process), there are two categories of capacity that should be thought through to help determine the amount of financial capacity required:

1. **Human capacity** – People, skills, and knowledge
2. **Tools and technological capacity** – Equipment and technology

To determine if you have the requisite financial capacity, you need to have a sound handle on the human and technological capacities required. You may gain some sense of costs from the indicator selection process (e.g., costs of implementation from another organisation or specific tools or licenses required that need to be factored in).

5.2.1 Human capacity

Fully incorporating new indicators may require training or hiring of additional expertise or securing vendors or short-term consultants. Brainstorm the technical skills and expertise you anticipate needing. These may include:

- Strategic thinking
- Information, collection, analysis, and management
- Subject matter expertise to collect or interpret the data (e.g., child labour, water quality)
- Design and operation of information systems
- Report and publication preparation
- Communications
- Reflective practice and learning (crucial for engaging different target groups throughout the process)

Identify all the individuals or business units that you expect to be directly or indirectly involved in the integration process:

- ? Which organisational staff need to be part of the integration initiative?
- ? Do you have organisational leadership championing the process?
- ? Who is responsible for the integration and strategy?
- ? Which departments of your organisation need to be involved? Which key players within those departments will be involved in the day-to-day management of the process?
- ? Who do you anticipate will be collecting or providing the data on the indicator (e.g., enumerators, implementing partners, certificate holders or managers of sustainable activities)? This decision has implications for data reliability, precision, and validity.
- ? Who do you anticipate will be managing and analysing the data on the indicator (e.g., M&E team, consultants, data analysts, specialists)? This decision has implications for data reliability, precision, and validity.
- ? Who do you anticipate providing any requisite training?
- ? Who do you anticipate providing data management system build out?

For each individual or business unit you listed:

- ? What is the responsibility of each person?
- ? Are the responsibilities clearly outlined in each person's official job description or will they be?
- ? What percent of this unit's or person's time will be dedicated to the initiative?
- ? What skills and capacity are required?

- ? Do the individuals and units identified have the technical capacity to carry out the anticipated functions?
- ? If not, what is the gap between the necessary technical capacity and existing technical capacity?

5.2.2 Tools and technological capacity

These capacities are often under the domain of an organisation's Information and Computing Technology (ICT) department. Tools and technological capacity include the computers, hardware, software, data management and storage, and analytic tools. Although not technically a tool or technical resource, internet connectivity and mobile networks are also important to consider as part of data capture, transmission, and information dissemination for the indicator(s). Your tools must support the whole data value chain, from data capture to reporting, going through data cleaning, mapping, upload, transformation, analysis reporting, and possibly automated export and publication of the datasets and results. Evaluate your current tool set and make sure that they will be fit for purpose and that you will have the resources to use them. If you do not, consider switching tools and looking for external support.

In each of the four data value chain stages ICT considerations are presented. Reading through the full document can assist in identifying essential ICT elements that should be factored into estimating your capacity and resource requirements. To better understand some of the basic ICT considerations not specific to the data value chain stages, please see the discussion in Appendix 6 which describes build costs, run costs, support, availability, and other non-functional requirements in more detail.

To the best of your ability, brainstorm the ICT resources you anticipate will be required. Some guiding questions include:

- ? Reflect on the tools and enterprise data system architecture already in use within your organisation. Do you want to use these, or do you want to introduce new tools and architecture to enable and leverage new functionalities?
    - For collection, this can include tools such as tablets, GPS, software, mobile phones, servers (may be rented), etc. In relation to communication, understanding how newsletters, dashboards, reports, and website development will be involved has capacity implications.
- ? Can you estimate the build costs?
- ? Do you have a sense on the ongoing run costs?
- ? Can you estimate the overall project management costs for testing the new run procedures and any new build costs?
- ? Does the organisation have existing financial capacity to cover these costs?
- ? If not, how can you acquire it? Is there budget you can reallocate; will it require fundraising?
- ? If you do not think you can fill the gap, identify this as an issue to be resolved before advancing with full integration of the indicator.

5.3 Establish the project teams

Once you have identified the capacity, resources, and specific staff that will need to be involved, it is useful to name the project team, especially those individuals that are cross-department and cross-organisational that need to be part of the project team. This action also includes the eventual hiring of specialised expertise if needed. Indicator integration requires incorporating the views and expertise of various stakeholders to ensure you do not miss key information or perspectives. Consider setting guidelines for these teams that include timelines, planned engagements, a shared communication strategy, and reporting framework.

5.4 Establish and implement a communications plan

It is important to develop a plan for how you will engage with key stakeholders throughout the process. The communications plan should cover both internal and external communication requirements. Regular communication and information sharing will build teamwork and trust in the process and help to manage expectations and the team's ongoing involvement.

It is important to clarify and communicate why the indicator is being considered for integration, and how you expect the data will be used. This should have already been defined when selecting the indicator. This is not only useful for strategic framing but can also be used to frame informed consent for data collection and licensing agreements for data use and sharing. Core elements to include in this initial communication include:

- How the indicator fits into your theory of change and strategic objectives.
- Anticipated reporting goals and frequency that describe how the indicator(s) will be used/reported.
- Timelines for integration process.
- Business unit leads and associated project teams.

6. Stages in the data value chain

Once a strategic framing has been formed, the concept of the `data value chain' can be used to guide deeper thinking and planning for integrating the new indicators. In Table 1, key considerations that an organisation should take and expected planning outputs are summarised for each stage of the data value chain.

The data value chain is like other value chains, in that it breaks down the processes into subsystems, each involving inputs and outputs. How the subsystems are managed affects the quality, cost, and ultimately the value of the final product. Useful and communicable insights are the key products from a data value chain. Though the number of stages and terminology for describing of the data value chain can vary from organisation to organisation, a four-stage data value chain is used in this document. The four stages are briefly described below.

1. **Generation:** Data capture, acquisition, and obtaining informed consent. This refers to the collation of the raw data (whether by a human, sensor, or another data repository) from both internal and external sources. It involves clarification of what data to collect and the processes to do so. Decisions made here will affect the quality and usability of the data throughout its life cycle.
2. **Transmission and validation**, sometimes also referred to as collection. Once the data is collected it needs to be processed and validated. This involves identifying and correcting corrupt, inaccurate, or irrelevant data. It also ideally involves converting raw data into usable, interoperable, and machine-readable formats within your data enterprise ecosystem and beyond. Additional curation activities include establishing the required processes to merge data from different sources into a cohesive database and defining and adding the contextual metadata so that it is discoverable and usable throughout your organisation's data ecosystem.
3. **Analytics:** Data processing and analysis. Once the data has been validated, labelled, and prepared for use, it can then be used to uncover patterns, trends, impacts, and other relevant business insights.
4. **Exchange:** Packaging and communicating insights, publishing, and sharing data. With verifiable data insights, this stage focuses on how the data is ultimately used and consumed by the various internal and external stakeholders in your extended data ecosystem.

As you move through the stages of the data value chain, different actors within your system will need to be responsible for either implementing or reviewing the considerations outlined in this document. A variety of internal and external stakeholders will sometimes need to be included to address issues (e.g., decision-makers, implementing partners, data subjects, subject experts, ICT, and other technical staff). To streamline and improve the indicator integration process, it is best to plan reflection and decision processes with the relevant actors in your sustainability system. For various questions, suggested target stakeholders are identified to facilitate reflection and feedback.

Table 1: The approach to indictor integration relative to each stage of the data value chain.

Data value chain stage:	Activity summary:	Key considerations:	Outputs:
Generation: Data capture, acquisition, and obtaining informed consent	Test and evaluate selected indicator(s) alongside those responsible for data capture and submission. Make any relevant adjustments and ensure proper consent to use the data.	• Measurement context • Sampling approach • Data capture capacity • Data capture tools and technologies • Data capture precision • Data governance	1. Data format, type, and permissible data values. 2. List of software or hardware requirements. 3. Recommended adjustments to data acquisition templates, methods, and protocols to accommodate for contextual caveats and use case requirements. 4. Language for clause revision of data governance policies to obtain consent and use rights. 5. Training strategy for data capture.
Data transmission and validation	Consider how the new indicator data will be connected to and move through an organisation's data curation and management system of storage locations, data stewards, and ultimate data users.	• Existing data infrastructure • Transmission formats and frequency • Transformation requirements • Data governance • Version control, backup, security, validation, and reconciliation • Data management roles and responsibilities	1. Data reference schema and taxonomy requirements cross-referenced with data generation templates (interoperability – ideally automated with online input and synchronisation capabilities). 2. Database architecture and functionality tested and adjusted to accommodate new data. 3. Revised data governance policy documents pertaining to data use rights, curation, and management.
Analytics: Data processing and analysis	Define analytics, outputs, and outline the set of processes that will be used to create data insights for your stakeholders (includes enriching data by joining datasets and exploring the data through various analyses and visualisations).	• Data appropriateness • Data analytics capacity • Analytic tools and technology requirements • Analytical comparability and precision • Data governance	1. Data analytics strategy that outlines analysis procedures and how the analytic outputs will fulfil core business objectives (e.g., related to improved monitoring and evaluation, continuous improvement for certified clients, assurance integrity and risk management).
Exchange: Packaging and communicating insights, publishing, and sharing data	Define how to package, report, and share insight products and associated data assets. Develop user-friendly interfaces and reports that enable new indicator data to meet strategic objectives (e.g., online dashboards, stories, and recommendations).	• Clarity and comprehensibility of reported results • Suitability and adequacy of reported results • Comparability of reported results • Indicator dataset publishing and sharing	1. Standardised reports with predefined designs, that are easily accessible and are tailored to user groups. 2. Clear licenses and adjusted agreements for publishing and sharing the data. 3. An effective communications plan designed to ensure relevant data and information products reach target audiences to facilitate timely decision-making and actions.

7. Generation: data capture, acquisition, and obtaining informed consent

The first stage of the data value chain is the capture and acquisition of the data with proper consent, or with another legal basis to use it. For sustainability systems, data generation is usually achieved through various mechanisms including assurance systems, certification, the certified entities themselves, and sometimes include other actors involved in field-level data gathering activities. You will want to work with these same actors to test and evaluate the indicator(s) you have selected and make any adjustments relevant for this stage of the data value chain. Appendix 4 provides a useful template for capturing decisions and information associated with this stage of the data value chain.

Data generation elements are presented in six subtopics: context, sampling, data capture capacity, tools and technologies, precision, and governance. The questions are designed to help you produce the following types of outputs:

1. Data format, type, and permissible data values.
2. List of software or hardware requirements for data acquisition.
3. Recommended adjustments to data acquisition templates, methods, and protocols to accommodate for contextual caveats and use case requirements.
4. Specific language for clause revision of data governance policies to obtain consent and use rights.
5. Training strategy for data capture.

7.1 Context

? Will any adjustments to the indicator data capture methodology be necessary for it to be relevant to the system's operational context (e.g., geography, commodities, actors)?

- If adjustments are necessary, it is important to preserve the comparability of the indicator results if it is being used by other organisations. It may require consultation with a subset of those organisations to determine how to adjust and maintain comparability.
- For example, the approach to measuring water use efficiency may differ depending on the commodity being produced, how water is used in the production process, and where in the world that water is being sourced. In these instances, adjustments can be at the level of data collection tools and possibly data sources, however the definition and measure of water use efficiency is expected to remain the same.

? If so, is there flexibility to make methodological adjustments to indicator methodology so that it is relevant to the system's context?

- Some indicators, particularly those that are part of broad internationally agreed frameworks may have standardised methodologies. This is often the case where data collation and comparability are a goal.

? If so, what adjustments are needed so that the piloting approach and data capture methodology are contextually relevant?

7.2 Sampling

? What representative sample size[5] or locations might be required for your broader portfolio and or activities defined by your scope?

- Ideally your pilot sample will be large enough that the collection context is somewhat representative of your portfolio and or activities. You will also want to make sure that it is refined enough that you have the capacity to analyse qualitative feedback on the process from data capturers/providers.
- If you have a particularly large and diverse system that operates across multiple geographies and or commodities, you may want to consider a sample specific to one context first, or a few representative contexts, and then follow up with additional data capture pilots to assess relevancy in other contexts.

7.3 Data capture capacity

Revisit the capacity assessment results outlined in section 5.2.1. Use the following questions to determine if you missed any capacity gaps as you think through data capture and acquisition.

? Do the actors that will be responsible for providing or capturing the data for the indicator(s) have the relevant expertise and or capacity to do so?

? What guidance resources or training might you need to provide, or what adjustments to existing methodological materials might you need to make, for that actor to be prepared to capture or provide data effectively and reliably?

- You will likely already have tried and tested mechanisms that align with your systems auditing or M&E data capture approach that you have previously used for implementing and building capacity around data capture.

? Will additional human resources need to be mobilised to enable the data capture for the indicator(s)? If so who and how much?

[5] For detailed guidance on sampling strategies see https://s3.amazonaws.com/wxlongform/featuresms/wp-content/uploads/sites/14/links/ISEAL_136_pager.pdf, last accessed 1 March 2022.

- ? What is an appropriate approach for the data capturers to provide the data they capture for the indicator(s)?

7.4 Data capture tools and technologies

Revisit the capacity assessment results outlined in section 5.2.2. The following questions reflect on equipment, hardware, software, and the capacity to use new tools and technologies for capturing and acquiring data for new indicators.

- ? Do designated data capturers or providers already have access to the tools and or technologies required to measure the indicator?
- ? If not, what needs to be done to source and distribute new tools or technologies?
- ? What capacity building might be required to prepare data capturers or providers for the use of any new measurement tools or technologies? How should this be approached?
- ? Will you need to make any adjustments to your existing data capture activities to implement these new tools or technologies? Alternatively, can you streamline the capture of other existing data using the newly identified tools or technologies?

TIP: It is important to pay attention to offline capability when selecting your data capturing approaches. Note geographies with limited wireless data connection and make sure that applications can be used in the language of choice most adapted to the users or actors that will be undertaking the data capture.

TIP: As feasible, think about the security of the capturing devices that will be used. Though it can never be completely avoided, some efforts should be taken to at least make it difficult to export or copy data from the capturing devices (e.g., require passwords and other security measures).

TIP: Depending on your organisation, data may be captured from your staff or agents you hire, who have limited or no accountability to you (e.g., farmer cooperatives), or from a system delivering them to you. When data are provided by different sources, as much as possible, strive to ensure homogenised data formats. If data format is not agreed at the source level, it must be addressed in a subsequent stage and can be quite cumbersome to resolve.

7.5 Data capture precision

- ? Does the methodology for capturing data for the chosen indicator(s) pre-define a level of measurement precision for it, or its constituent metrics?
    - Precision is more important for quantitative indicators, less so or irrelevant for qualitative indicators.
- ? If so, is this specified level of precision relevant for the activities being measured, your organisation's reporting goals, and the needs of priority clients?
- ? If not, or the indicator methodology does not specify a level of precision, what would be your ideal level of precision for the measurement of the indicator? What methodological implications might this have in terms of data capture?
    - Determining an ideal level of precision should be based on your use case, expected outputs, audience needs, and what other data you anticipate you might be using to report the indicator.
    - Measurement precision is sometimes called 'granularity'.

7.6 Data governance

- ? What is the type, format and volume of data that will be collected?
- ? What metadata or information is needed for the data to be interpreted or used for intended objectives throughout the data lifecycle or possible future reuse?
    - Examples might include descriptions of quality or limitations on use due to methodological aspects of sensitivity of the information.
- ? What information needs to be conveyed to data subjects to gain consent for data use, preservation, and sharing? How does it need to be conveyed so that consent can be informed in the given context[6]?
- ? Based on the responses to all above questions, what adjustments might be needed in the organisation's data governance policies and procedures to pilot and integrate the indicator?
    - Identify where acquiring the data for the new indicator may require adjustments to your data policy, data inventories, and sharing agreements/licences with your certificate holders, supply chain partners, and any actors more broadly.

[6] Basic guidance for obtaining Informed Consent for the Delta Framework indicators data collection (2022).

8. Data transmission and validation

This stage of the data value chain includes data transmission from the source and data validation. Here is where you think about how the new indicator data will be connected to and move through your organisation's data curation and management system of storage locations, data stewards and ultimate data users. It is important to establish who has access to the data at each stage in its lifecycle, as well as who is allowed to enter and/or modify the data.

The queries related to data transmission and validation are organised into six subtopics: existing data infrastructure; transmission formats and frequency; transformation requirements; data governance; version control, backup, security, validation, and reconciliation; and data management roles and responsibilities. The questions are designed to help you produce the following types of outputs:

1. Data reference model and taxonomy requirements cross-referenced with data generation templates (interoperability – ideally automated with online input and synchronisation capabilities).
2. Database architecture and functionality tested and adjusted to accommodate new data.
3. Revised data governance policy documents pertaining to data use rights, curation, and management.

Start with documentation for how your current M&E and audit data is transmitted and validated. This existing infrastructure and procedures are important to understand to frame governance and curation options. Ideally there are existing policies on data ownership, use rights, and routines for data collection, processing, and sharing that serve as the starting point. It is also useful to refer to documentation for your current data system maintenance, updating, and archiving procedures. Walk through the current documentation and determine how the new data aligns with these protocols or will be accommodated.

8.1 Existing data infrastructure

- **?** What reference systems will need to be included in the integration process? Specifically, where does it fit into the current data architecture and schema and what structural changes will be needed? What are the adjustments or fields, software, and data routines?
- **?** Does the new data need to link to other data (already within systems or other data sources)?
- **?** Will you need to install new software or similar technology requirements? What are the associated training/capacity requirements?

8.2 Transmission formats and frequency

- ? How will the data be provided from the data generation stage or source(s)? Will it be emailed in an Excel file or through an online data platform?
- ? How often will the data be collated? Are there any data synchronisation requirements? What is the periodicity of the data (real-time delivery, event-driven, does it align with other time-stamped data verification processes)?

> **TIP:** Data coming into your organisation's data enterprise system should always have a gatekeeping mechanism that includes a variety of data checking functions. All data should be considered tainted until they have been processed by the data interface checking functions. The most important part of this interface is the data interface format specification[7]. Select the format specification(s) that allows you to achieve the goal of rejecting data which do not correspond to the data specifications you have defined. It will provide substantial efficiencies in ensuring only clean and correctly formatted data come into your system's enterprise data framework.

8.3 Transformation requirements

Often data coming into your system from external sources require a series of rules or functions to be applied to ensure that the data can be loaded into the end target location.

- ? What, if any, new data rules and processing are required? For example, will you need to reconcile data in Excel or generate and upload reports between systems? Are there any data transformation requirements?

[7] Format specification provides the explicit editing information on the structure of a formatted data record. Common examples are JavaScript Object Notation (JSON) or Extensible Markup Language (XML). See Wikipedia for more comprehensive list based on data object types. There are a variety of websites that help in generating checking functions for different programming languages.

TIP: In computing, extract, transform, and load (ETL)[8] is the basic procedure of copying data from one or more sources into a destination system where the data is represented differently from the source(s) or in a different context than the source(s). ETL is used to synthesise data from multiple sources repeatedly and consolidate it into a single centralised location. Depending on your organisation's structure and ICT capabilities, ETL procedures may be established to automatically extract data from the source systems, enforce data quality and consistency standards, conform data so that separate sources can be used together, and finally, deliver data in a presentation-ready format so that it can be used in applications designed for targeted end users' decision-making goals. Well-designed ETL procedures can function as the above gatekeeping mechanism for your organisation.

TIP: Imagine you have two data sources, one from Vietnam and one from Ghana. Both sources are delivering information about a geographic area of interest, only the Vietnamese source delivers it in Vietnamese and the Ghanaian source in English. You will never be able to relate the two data sources subsequently. While this may not be a huge issue if the source data remain disjunct datasets, it will become a nightmare if you want to combine the two data sources. To avoid this, it is strongly advised to use standardiaed control vocabularies wherever possible in designing data capture and data storage systems. In this example, the use of ISO 3166 to describe the geographic area of interest would alleviate any issues for combining the data sources.

8.4 Data governance

? What additional metadata might be required to achieve proper curation and management for use and reuse?

- How will sensitive data be handled to ensure it is stored and transferred securely?
- Who "owns" the data?
- How will the data be licensed for reuse?
- Are there any restrictions on the reuse of the data?

[8] ETL is often used in data warehousing. Data extraction involves extracting data from homogeneous or heterogeneous sources, data transformation processes data by cleaning and transforming it into a proper storage format/structure for the purposes of query and analysis, finally, data loading describes the insertion of data into the final target database, such as an operational data repository (can also be a data mart, data lake, or data warehouse).

? What data will be archived and what are the policies and procedures for archiving? Archive policies should be distinct from backup solutions. This should address issues such as:

- Definition of a retention schedule,
- Rules for whom should have access to the archived files,
- Tenets as to what circumstances permit access to archived files, and
- Data security requirements.

? Have document templates for the required data schema (including all design specifications and associated metadata requirements) been developed? This requires understanding the format for how the data will be provided.

8.5 Version control, backup, security, validation, and reconciliation

Once you have a solid understanding of the scope and type of adjustments that are necessary to curate and manage the new data in your system, you may want to set up a series of agile test environments to explore the ultimate requirements for your data transmission and validation stage.

? Has a repository been set up to hold interim development objects (e.g., draft indicator descriptions or draft data acquisition guidance) associated with the integration process?

? Process for capturing test case results. Questions to consider and test include:

- What is the defined version management process for the data objects to be curated for the new indicator?
- What, if any, implications are there for current data backup and restore processes to accommodate the new data?
- What are the data security requirements, and do they involve any changes to current procedures?
- What is the data quality validation and reconciliation process for the new incoming data? At what points will these occur in the data flow, and who does it?

TIP: Think about the deletion of data. Initially, it seems counterintuitive to want to delete data. However, sometimes data need to be amended when it turns out that they have been wrongly captured or pre-processed. Therefore, it is a good idea to introduce batch numbers or any other suitable mechanisms for easy deletion.

8.6 Data management roles, responsibilities, and capacity

Revisit the capacity assessment results outlined in sections 5.2.1 and 5.2.2. Use the following questions to determine if you missed any capacity gaps as you think through the second stage of the data value chain.

- ? What are the respective roles and responsibilities for the test environment and final data infrastructure and data flow framework (administrator, processor, steward)?
- ? Does the organisation have the relevant in-house human and technological capacity to manage the data?

9. Analytics: data processing and analysis

Data analytics include the set of processes that are used to create data insights for your stakeholders. This often includes enriching data by joining datasets and exploring the data through various analyses and visualisations to determine the best way to communicate findings. For example, by putting data points on a map you can identify geographic patterns and spatial interactions of various data sources.

Questions associated with data analytics are organised into five subtopics: data appropriateness, data analysis capacity, analytic tools and technology requirements, analytical comparability and precision, and data governance. The listed questions are constructed to support in the development of a data analytics strategy that outlines analysis procedures and how the analytic outputs will fulfil strategic objectives.

9.1 Data appropriateness

Referring to your strategic objectives for the new indicator integration (section 5.1), and the requisite type of analytics you plan to employ, there are a variety of considerations to contemplate.

- ? Do you have the right data for answering your questions?
- ? Are there options to incorporate quick wins through development of mock-up reports or dashboards for key stakeholders? These mock-ups can be used to reflect on potential benefit, utility, and appropriateness of the analytic products.
- ? Can you draw accurate conclusions from the data?
- ? Is the sample size sufficient to support the claims you want to make?

9.2 Data analysis capacity

Revisit the capacity assessment results outlined in section 5.2.1. Use the following questions to determine if you missed any capacity gaps as you think through the third stage of the data value chain.

- ? Do the actors analysing the data have the relevant expertise and or capacity to do so? What guidance, resources, or training might you have to provide, or what adjustments to existing materials might be needed for the actor(s) to be prepared to manage, analyse, and report that data effectively and reliably?
- ? Is subject expertise required to reliably design the analysis and interpretation?

9.3 Analytic tools and technology requirements

Revisit the capacity assessment results outlined in section 5.2.2. Use the following questions to determine if you missed any capacity gaps.

- ? Are new analytical tools required to process the indicator data effectively? Are there any additional technological or tool requirements for analysing the indicator data?
- ? Do data analysts already have access to the tools and or technologies required to analyse and report on the indicator data, and are they familiar with the use of these tools or technologies?

9.4 Analytical comparability and precision

- ? Does the data need to be compatible for comparison and analysis against data on other indicators and metrics your organisation already collects, or data from secondary sources?
- ? Do the reports need to be comparable to other organisations' reports for key stakeholders (e.g., national reporting against the SDGs)?
- ? Do the analytics meet the precision and timeliness requirements for supporting decisions and actions?

9.5 Data governance

- ? Are your data sources and assumptions well documented to support data provenance to allow appropriate credit or attribution of source?
- ? Can you document data lineage for the various data sources, including origins, and what adjustments have happened throughout the data life cycle?

10. Exchange: packaging and communicating insights, publishing, and sharing data

This final stage of indicator integration is using the data to inform business decisions and transforming information into action. This is the stage where the various user-friendly interfaces and reports are designed to enable the new indicator data to meet the strategic objectives outlined under the strategic framing and indicator selection stages. This process may involve designing dashboards, recommendations, stories, or other vehicles best suited to inform the different strategic audiences. This is also the stage where datasets that are intended to be shared or published are made available.

Best practice for informing the design and content of the various results is to convene focus groups for the different reporting products. Participants should reflect on the usability of the various information outputs relative to their information needs. Examples of the types of actors to involve in the review processes include analysts, subject experts, system decision-makers, report generators and users, and targeted end-users of the reporting products. A critical actor to include in this consultation process is the producer, certified entity, or actor at the origin of the supply chain whose sustainability practices are being measured by the new performance indicator(s) being integrated. Consultative review of the indicator result reports improve the likelihood of meeting stakeholder expectations and ultimate objectives for integration of the new indicator(s).

The questions at this stage are grouped into four subtopics: clarity and comprehensibility of reported results, suitability and adequacy of reported results, comparability of reported results, and indicator dataset publishing and sharing. Typical outputs related to this stage include:

1. Standardised reports with predefined designs. The reports are easily accessible (just a few clicks) and can be consumed by relevant users' level of experience (tailored to user group).
2. Clear licenses and adjusted agreements for publishing and sharing the data.
3. An effective communications plan that is designed to ensure relevant data and information products reach target audiences to facilitate timely decision making and actions.

10.1 Clarity and comprehensibility of reported results

- **?** Are the insights and standardised reports generated from the new indicator(s) in a readily digestible and understandable format?
- **?** Are the reported results comprehendible and do they make sense to the target audience?
- **?** Do the visualisation techniques (e.g., tables, charts, maps) used in the reports help in communicating the intended messages clearly and efficiently to the users?

? Do the results framed in the reports make it clear what actions need to be taken and by whom to improve a specific sustainability issue or how one should think about a particular issue?

10.2 Suitability and adequacy of reported results

? Do the reports answer your original question(s)?

? Do the indicator results meet the key objectives that were outlined in your strategic framing for the integration?

? Does the results report provide the information that the target audience needs to support the targeted decision-making objectives?

? Are there any limitations for drawing conclusions? Are there any caveats that have not been considered?

10.3 Comparability of the reported results

? Are the indicator results that are reported sufficiently comparable with other indicators or data sources within or outside your organisation (e.g., correct generation frequencies and precision)?

10.4 Indicator dataset publishing and sharing

? Will the indicator dataset(s) be published or shared through other license agreements[9]?

? If yes, how will the data be shared? NOTE: Data sharing objectives and methods should be covered in the consent agreement with data subjects:

- How will potential users find the data?
- With whom will you share the data, and under what conditions?
- Will you share data via a repository, or handle requests directly or use another mechanism?
- When will you make the data available?
- Will a data sharing agreement or other licensing be required?

[9] See Structuring data sharing and licensing agreements for guidance.

11. Conclusions

Integrating performance indicators requires careful preparation and planning, and it can be quite a lengthy and iterative process before an organisation fully achieves regular reporting for the new indicators. This can be true even when integrating indicators that are already well defined and widely applied. Be sure to allow sufficient time for the full process, build in reflection at each stage, and plan for contingencies.

A wide variety of system adjustments will likely be needed to accommodate the new indicator(s). Taking a consultative and iterative development approach, founded on user testing, reconciliation of issues, and repeating the process at each stage of the data value chain can help ensure that the approaches implemented can satisfy the defined use case, are appropriate for the measurement context, and fall within organisational capacity.

Start small and pilot iteratively to allow subsequent recommendations and adjustments. The process for integrating a new indicator likely entails testing multiple times across different geographies and commodities to account for contextual differences. In deciding how many iterations are necessary, it is most important that you can refine and improve your data generation, transmission, validation, analytics, and exchange approaches to a point where you feel comfortable that they are meeting the objectives you set out in your strategic framing for indicator integration.

Appendix 1: Background materials and associated initiatives related to development of this document

This document was developed alongside piloting of the Delta Framework indicators. The Delta Sustainability Framework aims to align sustainability monitoring and reporting within and across the cotton and coffee sectors. It provides a common and standardised set of 15 impact and outcome indicators to measure and report on sustainability improvements. The indicators are paired with guiding principles for generating and communicating sustainability information to certified entities and producers, governments, businesses, and ultimately consumers using the defined indicators. The framework has strong alignment with the Sustainable Development Goals to promote a harmonised approach for measuring and communicating sustainability results.

This document also builds on the knowledge of sustainability systems, and their examination of various implications associated with improving measurement of sustainability performance indicators. Relevant resources include:

- **Aligning and combining: What we've learned about metrics and data sharing (Nov 2019)** – Covers selecting and testing a metric but very high level – Relevance, Feasibility, and Usability.
- **Income measurement practitioner's guide (March 2022)** – A collection of resources developed under the Living Income Community of Practice that outline specifics of determining measurement approaches – relevance to use case, context, capacity, and other choices.
- **Key learning from ISEAL's work on measurement and data (2022)** – A briefing note that summarises recommendations and core learning from ISEAL's work on metrics and data over the 2020-2022 period. It specifically showcases learning that has broad applicability across sectors, issues, and geographic scales.
- **Making credible jurisdictional claims (Oct 2020)** – Makes metric choice recommendations around reliability, accuracy, spatial resolutions, temporal resolution, and cost and availability.
- **Performance metrics for key sustainability issues (Aug 2020)** – Provides metric options and trade-offs and guidance on how to pick from the pool.
- **Structuring data sharing and licensing agreements (Aug 2020)** – Discusses core concepts, such as consent and rights, that underpin governance of data use and sharing, and proposes general principles and steps for a reasoned and documented approach to data rights, control and sharing for the ISEAL community.
- **Unlocking the value of your data (Aug 2020)** - This document provides practical guidance for sustainability systems to support them in generating valuable and actionable insights from data. Utilising concepts in data science, it is intended for sustainability systems seeking to maximise the value of their data, combine data sources, and enable improved data-driven decision-making procedures.

Relevant projects from which more general learnings around indicator integration have been extracted:

- Delta Project
- Developing and Improving Poverty Impacts project
- ISEAL Common Core Indicators
- Global Coffee Platform – Coffee Sector Indicator Framework
- Global Living Wage Coalition
- Living Income Community of Practice
- Information and Data Standard for Sustainability
- ISEAL Certification Atlas Project
- Framework for gender disaggregated data

Appendix 2: Overview for defining what and how to measure

For performance measurement or any other data collection activity, deciding which metrics, methods, and data sources are appropriate is a common challenge. For a particular topic or issue, there are typically many metrics and indictors to choose from, and several subsequent methodological decisions that need to be made. At the same time there is a difficult balance to strike between the need for accurate, and fit-for-purpose data, and the implementation of a feasible and cost-effective approach. This appendix provides a summary of how to approach selecting indicators and their methodologies to ensure that they are viable to collect and can meet organisational goals.

Deciding what to measure – selecting indicators

When deciding what indicators and subsequent metrics to measure, there is no need to reinvent the wheel. Identifying opportunities to align with existing frameworks, initiatives or leading organisations is a sensible first step. Choosing pre-existing metrics and indicators can support alignment and comparability across organisations, enabling collaboration and the scaling of interventions[10].

The process and considerations made when selecting an indicator from an existing pool will have implications for your methodological approach to measurement and your strategic framing, testing, and integration of that indicator. It is therefore important to capture details of decisions made during indicator selection so that they can be referred to during the integration process.

Before conducting a search, it will be important to clearly define the use case for the new indicator i.e. What will its purpose be? What questions do you want to be able to answer? What are you trying to understand, achieve, say, or do with the results? Use case definition should ideally begin with an organisation reflecting on its theory of change or organisational goals or aims. A clearly defined use case should provide the parameters to inform the selection of indicators that are effective and appropriate.

Both use case definition and indicator selection should be participatory; engaging several actors both within and outside of your organisation, to whom the indicator will be concerned. Although involving multiple stakeholders early on can be time-consuming, it can save a lot of time down the line because the needs and priorities of stakeholders are clearly specified and considered from the outset. Stakeholder engagement supports more effective indicator testing and integration, helps to avoid collection pushback, and increases the likelihood the results will be accepted and acted on.

[10] See 'Performance metrics for key sustainability issues' for an overview of good practice metrics for the issues of deforestation, biodiversity, water use, forced labour, poverty, and Greenhouse Gas emissions.

To identify stakeholders to engage, consider who will be the primary consumers of the data and information generated from the new indicator(s). It is important to think about the variety of clients and stakeholders who will use the indicator(s) and their specific information needs and expectations (including producers). You will want to consider how best to engage the priority clients and communicate with them. List the priority clients for the indicator(s)/data. It is useful to break this down into your internal business units that will use the data and external clients, because their information needs will be different and require different processes to report.

Table 2: Example demonstrating identification of internal and external data users

Example internal clients (business units)	Example external clients
Market development	Certificate holders
Assurance and M&E	Certification Bodies
Communications	Retailers
Fundraising and Development	Governments

TIP: Prepare use cases for target audience outlining how the data are expected to be used, and include related quality and accuracy requirements – what is good enough? (e.g., To justify changes in farming practices requires good quality and accuracy versus reporting of aggregated marketing statistics).

The process of prioritising and selecting a sustainability indicator from a pool is going to be unique to your organisation and operational context; highly influenced by system priorities, and what your stakeholders collectively define as important. However, there are several key attributes of sustainability indicators that you can consider honing these discussions[11]:

- **Relevance** - How appropriate is the indicator for the sustainability issue being measured?
- **Scale** - At what scale is the indicator typically applied (e.g., farm, landscape, supply chain, or sector)?
- **Scalability** - Is there evidence that the indicator is scalable across contexts and or operations?
- **Attribution** - Is the indicator underpinned by an evaluative approach that supports designation of the results?
- **Level** - Does the indicator address outcome or impact performance?
- **Usefulness** – Is the indicator widely used, linked to global commitments, and easily communicable?

[11] For further detail on how to choose an indicator from an existing pool see Performance metrics for key sustainability issues and Aligning and Combining: What we've learnt about metrics and data sharing.

- **Feasibility** - Is there evidence that the indicator and its metrics are practical to implement? Are there new technologies emerging that enable efficient indicator data capture and management?
- **Context sensitivity** - Is the indicator context sensitive?
- **Change responsiveness** - Is the indicator responsive to change?
- **Baseline data** - Is baseline data available on the indicator to provide context?
- **User package** - Does a 'package' exist for full implementation of the indicator (e.g., benchmarks, baselines, tools, and methodologies)?

It is highly unlikely that any individual indicator would satisfy all these considerations, and so it will be up to your organisation and stakeholders to identify which are of the greatest priority.

Once you have determined which are most important, next is to identify a pool of indicators to choose from and gather as much information as possible on what collecting, managing, and analysing the different indicators would entail from available sources. You may also want to consider reaching out to other organisations or initiatives currently implementing the indicator to get a better sense of what implementation involves, and whether this matches your organisation's capacity and needs.

Then, assess the indicators against the indicator attribute considerations prioritised by your organisation and stakeholders to identify a refined pool or individual indicator. A final filter for selecting an indicator will be to then assess against the following questions:

? **Use case** – Does the indicator seem sufficient to satisfy the measurement use case defined by your organisation and stakeholders?

? **Audience** - Is the indicator relevant for, and understandable to, your audience and stakeholders? Does it fulfil their demands and needs?

? **Flexibility** - Is there, and will you require, flexibility to make methodological adjustments to indicator collection and reporting? (Some indicators, particularly those that are part of broad internationally agreed frameworks may have rigid methodologies).

? **Replaceability** - Is the indicator replacing one that you already measure on that issue or area of performance? Can you feasibly replace it?

? **Alignment** - Does the indicator align with broader reporting frameworks such as the SDG's?

Once these questions have been responded to with stakeholders, there will ideally be an indicator that stands out to consider for testing and integration. Capturing the answers to these questions will also be useful for your strategic framing for integration.

TIP: Good indicators for measuring sustainability performance are direct, reliable, relevant to policy making, and easy to understand. They must be specific, measurable, achievable, relevant, time-bound, and trackable. It is also important to think about scale of application. It may be that different performance indicators are required to measure changes at different scales e.g. when referring to different subjects/units or geographic extents.

Defining how to measure – choosing a methodology

Once and indicator has been selected, there may be methodological decisions that need to be made before continuing the path to integration. This could be because the identified indicator does not have a fully defined collection methodology, or the defined methodology has some flexibility. However, even for indicators that are supplemented with clear methodological guidance, an organisation will likely still need to review and potentially adjust the collection methodology to ensure it is appropriate for organisational goals, relevant and effective in the measurement context, and can be feasibly implemented with the resources available.

Three key considerations underpin what approach and methods will be appropriate for measurement:

- **Use case** – What is your measurement purpose? What questions do you want to answer? What are you trying to understand, achieve, say, or do with the results? **(Should already have been defined during indictor selection).**
- **Measurement context** – What important factors might affect measurement in the measurement context? Are there any contextual caveats, norms or practices that might influence the type of data needed? Are there any contextual factors that might influence what methods will be appropriate?
- **Starting point and capacity** – What data do you have or already exists? What data collection efforts are already happening? Do you have capacity to collect the data? What is your budget and timeline?

Documenting and keeping track of these considerations will guide an organisation in making appropriate measurement choices and justifying decisions to stakeholders beyond the decision-making process[12] (see Appendix 4). It also means that there will be a paper trail to support indicator integration, defining appropriate data governance and licensing, and assessing comparability with external actors.

[12] The example form can be used by organisations to document the performance measurement definition process. This has been adapted from 'Income measurement practitioner's guide'.

Figure 2 visualises how these three considerations can be tackled in sequence to define and refine a measurement approach. This sequencing aims to ensure that the choices made are appropriate, effective, and feasible when implemented.

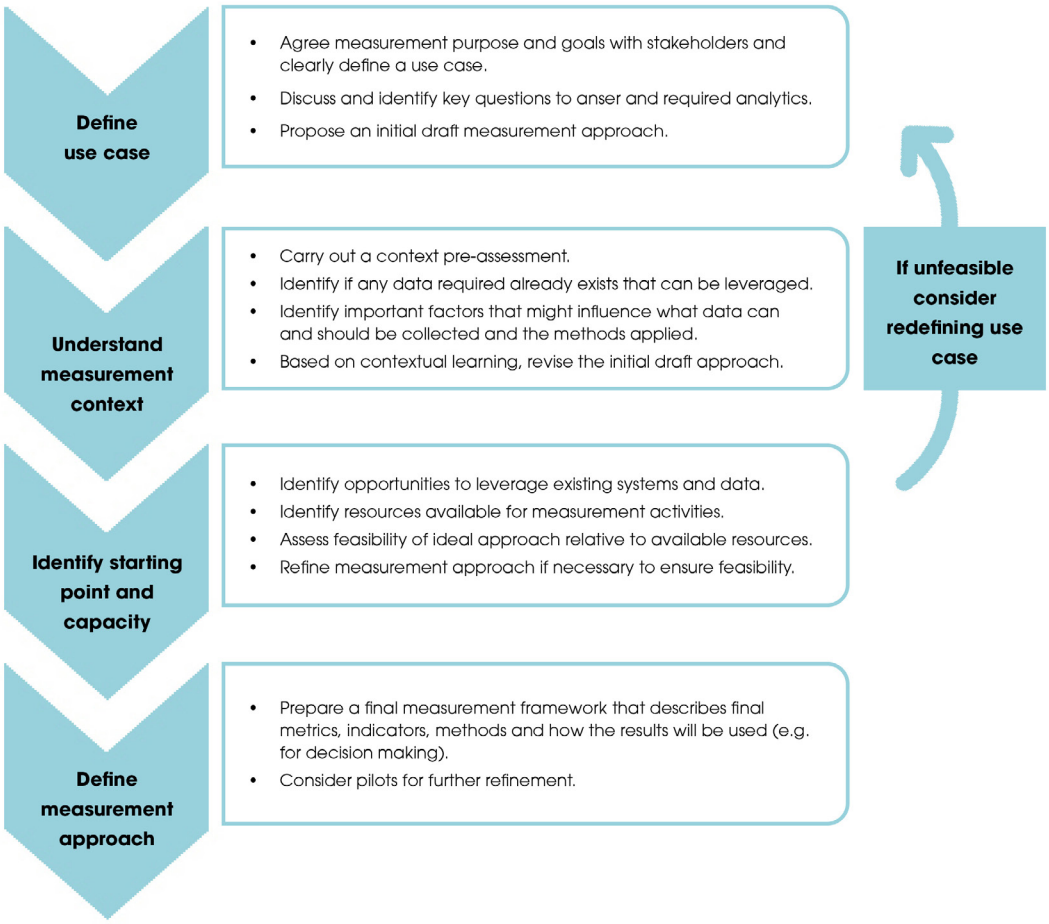

Figure 2: Recommended sequence for defining methods and an approach to measure an indicator.

Typically, when defining a measurement approach, organisations identify capacity and available resources as a starting point. However, this risks an organisation taking a resource-focused, rather than goal-focused approach. This can result in a measurement strategy that is not fit-for-purpose and that produces data that is not useful in the long run. Capacity decisions are nonetheless integral but should be prioritised at a later stage.

If any capacity considerations are to be made early on, the focus should be on identifying resources for use case definition and understanding context. These processes can then be used to draft an ideal measurement approach which can be examined relative to capacity, available resources, and existing systems and data.

If a draft measurement approach is then found to be unfeasible relative to current capacity, and efforts to leverage additional resources have been exhausted, then an organisation or initiative will need to consider a more feasible measurement use case and potentially a new indicator.

Key recommendations for deciding how to measure

To understand the measurement context(s), a pre-assessment should be undertaken. This can take the form of a secondary data review, interviews with local experts, a short survey, a focus group exercise, or a combination. A pre-assessment need not be exhaustive. What is important is that it identifies what is typical within the context(s) of concern, any potential caveats that inform the selection of appropriate metrics, methods, and what data might already be available.

When undertaking context pre-assessments, engaging with data subjects (e.g., producers) is strongly advised. Involving these stakeholders in measurement definition activities builds trust and ensures measurement effectiveness. Co-creative and inclusive approaches to data collection can be useful for improving the accuracy and precision of data and limiting the risk of collection pushback. It can also ensure collected data is appropriately licensed, with the needs and privacy of the data subjects properly accounted for, without limiting valuable derivable insights.

Engagement with data subjects (e.g., producers) throughout the measurement definition processes is also an opportunity to identify if and how data can be effectively fed back. Feeding back data or analytics can be highly effective for providing reciprocated value, empowering data subjects to make informed decisions to improve their own performance.

Taking stock of any relevant secondary data that exists on a topic or area of performance during context assessments is highly recommended. The leveraging of secondary data should not be considered an afterthought or independent exercise from measurement. If data already exists, there is no reason not to use it. Beyond providing insight into performance, secondary data can be valuable for better understanding the measurement context, filling data gaps, validating field collected data, and providing a comparator for primary data.

Regardless of whether data sources are primary or secondary, bringing together data sources to triangulate, validate and fill gaps can be highly effective for supporting improving the accuracy and reliability of measurement exercises. This is widely practised amongst economists and research institutes for measuring household incomes for example.

Appendix 3: Six criteria for indicator evaluation and selection

Ultimately, you will want your indicator evaluation and selection process to generally meet the following six criteria.

1. When it is useful to have a standardised measure that you can compare over time and/or space.

- There is evidence that the indicator is needed.
- Stakeholders need and will use the information collected by the indicator.
- The information for the indicator is actionable and informs decision-making.
- Information is not available from other indicators or sources.
- The indicator can be harmonised with other indicators that your organisation uses.

2. When an indicator has demonstrated technical merit and is considered technically sound and fit for purpose. It should be sufficiently sensitive to detect changes in performance and be able to be measured consistently by different practitioners and yield the same results.

- The indicator is reliable and valid.
- The indicator has been peer reviewed.

3. When the indicator is fully defined and well documented. A fully defined indicator should specify:

- A clearly stated title and definition.
- A clearly stated purpose and rationale.
- A clearly defined method and unit of measurement for the indicator, including the description of the numerator, denominator, and calculation, where applicable.
- A clearly described data collection methodology and data collection tools for the indicator.
- A clearly defined data collection frequency.
- If there is any relevant data disaggregation, a clearly defined description of process.
- A clear framing of guidelines to interpret and use data from this indicator.
- A clear description of any challenges associated with using the indicator ideally alongside the specific strengths and weaknesses of the indicator when used.
- Where appropriate, citation(s) for relevant sources of additional information on the indicator.

4. When it is feasible to collect and analyse data for the indicator. This means you have assessed all aspects of the data value chain from data generation, collection, analytics through to exchange which includes reporting results and data re-use through sharing. This requires that all systems and mechanisms needed to collect, interpret, and use the indicator are functioning and that the financial and human resources are available to allow the indicator to be measured and that the benefits are worth the costs.

- The systems, tools and mechanisms that are required to generate, collect, interpret, and use the data for the indicator are functioning well.
- Where appropriate, the indicator data generation is incorporated into your systems' assurance and/or M&E processes.
- The requisite financial and human resources needed to measure, analyse, and report on the indicator(s) is available.
- Evidence exists and has been confirmed, that measuring the indicator is worth the costs.

5. When the indicator has a proven track record. It has been successfully field-tested and used operationally over time, with demonstrated value.

- The indicator has been field-tested and used operationally.
- The indicator is included in your organisation's approach to review and report on its performance.

6. When it can be incorporated into a carefully chosen coherent and balanced set of indicators. Because indicators merely indicate, it is important to use a well-defined set that provide balanced information that can be used to make relevant decisions about sustainability issues of interest.

- The indicator set provides an overall and adequate assessment of the sustainability issues being measured.
- The indicator set includes an appropriate balance of indicators across the sustainability issues.
- The indicator set has a feasible number of indicators.

Appendix 4: Checklist and form for defining a measurement approach

The checklist over the next 3 pages can be used by a practitioner to guide and track the process of defining methods and an approach to indicator measurement. The form on the following 2 pages can then be used to document final decisions to support the direction of measurement activities, ensure effective data governance, and facilitate the review of the data for comparability by other actors' post-measurement.

1. Define measurement use case	
Deliberate internally (e.g., with MEL team) and check the following boxes once completed:	
Define a general purpose and goals for measurement to discuss in consultations	(X)
Identify stakeholders to include in consultations to define a measurement use case	(X)
Considering and reach out to producers or data subjects to include them in use case consultations is recommended.	
Undertake use case consultation(s) and check the following boxes once completed:	
Revise and adjust measurement goals following feedback and consensus.	(X)
Agree the specific use case(s) to be addressed through measurement.	(X)
Choose between 'understanding magnitude', 'measuring progress', and or 'defining strategies'. Provide details.	
Agree a set of analytical outcomes and outputs.	(X)
What do you want to be able to know, say, or do with the data? How will it be used and by who?	

2. Reflect on use case to draft a measurement approach	
Reflect on the defined use case(s) and check the following boxes once completed:	
Clearly outline the scope of measurement activities	(X)
Be specific e.g., geography, number of data subjects, data subject characteristics, products, sector etc.	
Define the unit of analysis	(X)
Are you concerned with individuals, groups, or an entire population?	
List all the individual metrics you will need to measure that contribute the indicator of interest and score or rank them relative to importance and the perceived level of detail required.	(X)
For example, 'income from primary crops' 'income from secondary crops and other farm produce' and 'production costs' are all metrics that contribute to the indicator 'net farm income'. Depending on the defined use case these different metrics will hold different levels of importance and will require measurement in different levels of detail.	
Propose data collection methods for each income component based on relative importance.	(X)
Consider more resource intensive methods for more important components and vice versa.	
If any primary collection methods are proposed (i.e., field books and record keeping, surveys, or focus groups) undertake the following activities:	
Define an appropriate sample size and composition for any primary data collection activities.	(X)
Propose actors that might be most appropriate for collecting or submitting primary data for each method proposed.	(X)
E.g., Trained enumerators, cooperative leaders, community representatives, data subjects themselves etc.	

3. Understand measurement context	
Undertake a context assessment and check the following boxes once completed:	
Identify and describe any contextual circumstances that might mean additional metrics or information will need to be captured to contribute to the defined indicator.	(X)
E.g., If looking to measure net farmer income, it may be normal in the measurement context for farmers to use vehicles in production. The cost of running and maintaining vehicles would have to also be measured to accurately assess net farmer income in the context.	
Identify and describe any contextual caveats that could influence the effectiveness or feasibility of enumeration attempts.	(X)
E.g., Cultural considerations, customs, limited record keeping, and literacy and numeracy rates. Be specific.	
Outline any suggestions that might help to improve the effectiveness of measurement activities.	(X)
E.g., Smallholders prefer to submit income data themselves instead of being surveyed by enumerators.	
Identify any secondary data sources that could potentially be used to support measurement.	(X)
E.g., National statistics, academic research, company datasets, cooperative or individual farm records.	

4. Reflect on contextual understanding to refine measurement approach	
Reflect on contextual learning and check the following boxes once completed:	
If justified, make appropriate adjustments to the proposed measurement methods based on contextual learning.	(X)
List and describe any special considerations that should be made when implementing any of the proposed methods.	(X)
Consider adjusting the actors responsible for collecting or submitting data for each proposed method if necessary.	(X)
Consider whether digital tools would be appropriate and feasible for capturing and standardising any primary data, and list appropriate tools.	(X)
E.g., Digital surveys, online submission forms, mobile survey applications etc.	
Consider and describe opportunities to leverage secondary data identified through context assessment to support income measurement activities.	(X)
E.g., Cross-referencing, triangulating, validating primary data, interpolating, or modelling missing values	

5. Assess feasibility of proposed approach relative to starting point and capacity	
Reflect on systems currently used to collect data and check the following boxes once completed:	
Identify any ongoing measurement activities or data subject interactions in context of interest and describe how these could be leveraged or adjusted to support measurement in this instance.	(X)
Revise the proposed measurement approach based on all previous activities and check the following boxes once completed:	
Prepare a costing for implementing the proposed measurement approach in the context of interest.	(X)
Break down costs for individual components (e.g., methods and personnel) as well as the total.	
Outline the resources and budget currently available to undertake measurement activities.	(X)
Input figure and breakdown if relevant.	
Consider the feasibility of the proposed measurement approach relative to the allocated budget, and if unfeasible, consider options to reduce costs without undermining the satisfaction of the measurement use case.	(X)
If methodological adjustments cannot be made to ensure measurement is feasible, consider opportunities to leverage additional resources.	(X)
Additional resources could come from budget reallocation, fundraising, or collaborative measurement.	
If adjustments cannot be made or additional resources leveraged, consider simplifying the measurement use case so that it can be feasibly satisfied with the resources available.	

6. Finalise a measurement approach for implementation		
Reflect on all decisions and outline a final approach to income measurement once completed:		
Year or date range represented by data collection: If data collection will be continuous, input 'ongoing beginning X date'		
Use case: Check appropriate box(es) and provide a full description, including specific research questions.		
Understanding magnitude	(X)	
Measuring progress	(X)	
Defining strategy	(X)	
Measurement scope: Include details of geographies, data subject characteristics, products etc.		
Unit of analysis: E.g., Individuals, groups/segments, or an entire population		
Methods: Input income data collection methods, and additional metrics and methods (add new rows if applicable)		
(Input additional metric #1)	(Input collection method)	
(Input additional metric #2)	(Input collection method)	
(Input additional metric #3)	(Input collection method)	
(Input additional metric #4)	(Input collection method)	
(Input additional metric #5)	(Input collection method)	
(Input additional metric #6)	(Input collection method)	
(Input additional metric #7)	(Input collection method)	
(Input additional metric #8)	(Input collection method)	
Sample size and composition: Input for all primary data collection methods. Leave blank if relying on secondary data.		
Data cleaning procedures: Outline any data procedures outlines or applied for cleaning, extrapolating, or filling data gaps.		

Analytical outputs and or outcomes:
List, describe or provide links to any outputs or outcomes from income measurement activities.
Any other comments:
Describe any considerations, caveats, limitations, or assumptions worth highlighting.

Appendix 5: Indicator development worksheets

Indicator selection and integration is an iterative and adaptive process. At each stage of the integration process, you want to assess relevance and feasibility, while considering implications for scaling up integration of the indicator across your system. This will involve:

- **Indicator selection** - Assessing if an indicator is generally appropriate for your system and aims.
- **Indicator data capture piloting** – Clarifying any adjustments that might be required to the indicator and or its collection methodology (where permitted).
- **Indicator analysis and reporting testing** - Identifying additional system modifications and activities that would be needed for analysis, reporting, and full integration of the indicator (e.g., further or more refined guidance and training).
- **Indicator system integration** - Clarifying resource implications and requirements for full indicator integration to then integrate systemically.

Agile and iterative development is founded on user testing, reconciliation of issues and repeating the process (see Figure 1). Start small and pilot iteratively to allow subsequent recommendations and adjustments. The process for integrating a new indicator may also entail testing multiple times across different geographies and commodities to account for contextual differences. In deciding how many iterations are necessary, what is most important is that you can refine and improve your data generation, transmission, validation, analytics, communication, and sharing approaches to a point where you feel comfortable that they are meeting the objectives you set out in your strategic framing for indicator integration.

As part of implementing an agile and iterative development you will want to develop a variety of feedback methods to define recommended modifications. Whatever feedback mechanism you choose, it will be important that it is able to capture both quantitative and qualitative information on the relevant data provider or user experience. It should be simple enough to respond to accurately and easily, whilst ensuring the provision of sufficient detail to inform necessary adjustments and next steps that might be required. An example set of questions is proposed in Table 3. These questions can be used to guide implementation of an indicator once it has been selected.

Table 3: Example indicator development worksheet

Question
Issue, outcome or risk area:
Indicator protocol (clearly define with method of calculation and expression):
Relevance
To whom is it relevant and how will they use it?
Is it critical for short or long-term decisions?
For which specific decision(s) is the indicator expected to be important?
When is the indicator required: How frequently? How detailed? How soon?
Feasibility
What data will be used and who will supply it? (Is there currently a collection program for the data, will it have to be extracted from one or more source, or will it have to be collected newly – through monitoring, questionnaires etc.?)
Form of available data? (Raw, digitised, tabular)
Availability of existing data: timing, detail frequency?
Confidentiality considerations:
Is data readily suitable for use in its present form, or will calculations, transformation, or analysis be needed for use to address the specific issue? If manipulation/extraction is required, will it be done by the provider or will it have to be done by the SS?
Who will be doing the analysis of the information, and how often will the information be provided?
Who will cover cost and technical needs of data collection?
Who will cover cost and technical needs of data analysis?
Credibility
Who is the source of the information? (Census, government, self-reported, auditor?)
Is the data source independent, reliable, and consistent?
What assurances are there of scientific soundness and objectivity?
Clarity
In what form will the indicator be presented for the different users? (Forms of reporting, communication and portrayal: e.g., annual reports, graphic presentation, raw data or ratios, etc.)
How detailed, how frequent, and how current must information be to allow it to be used/publicised in this way?
Who will be the key users, and how will the indicators be phrased in terms easy for them to understand?
How will the indicator help in analysing the poverty issue in question, how will it be linked to planning and decision-making processes (e.g., periodic reports, issue reports, plan evaluations, etc.)?
Comparability
Is the indicator in use in this form in other destinations, and/or are there standards of comparison to which it can be related?
Key benchmarks to be used
Means by which change over time in the destination is to be analysed and portrayed:
Operational concerns
Who will be accountable for managing the procedure to produce the indicator on an ongoing basis?
To whom will the indicator be provided and in what form?
Is there a continuing commitment to monitor this indicator?
Next steps
What is the specific workplan/timetable for making this indicator operational?

It is also important that the process can clearly identify any challenges or unexpected issues that arise. It is useful to define key learning questions that you want to track and assess at the start of the process and consider how these learning questions can help inform future indicator integration efforts.

Additionally, it is useful to include an overall monitoring and management protocol for the entire indicator integration process. To do this you will want to set parameters for success and include measurable objectives and milestones to track progress toward success.

In summary, it is important to be aware of the potentially long lag time between deciding to implement a new indicator, designing, and building systems and capacity, and receiving useful reports on the new indicator.

TIP: sustainability standards are dynamic approaches and indicators will need to change over time.

Indicators are applied in a complex and changing environment and should be reviewed on a regular basis to ensure they reflect learning and changing conditions. Questions for review might include:

- ? Does the indicator still measure the issue it was designed to measure?
- ? Are the issues still relevant?
- ? Are there changes to be made to data collection based on lessons learned?
- ? Does new technology exist that affects the relevance or applicability of the indicator?
- ? Is there new information or technology that could affect collection system or evaluation?
- ? Are the results clear for target audiences, easily understood, and meaningful?
- ? Are new data sources and information available that can be combined to generate new insights or replace the indicators?
- ? Do indicator results enable design of actions?

Appendix 6: Common ICT factors applicable to integration of new indicators into an enterprise data architecture

This appendix aims to provide additional material to assist an organisation in integrating new indicators into their existing enterprise data architecture. Its content is organised into six topic areas including build cost, run cost, project management, availability and other non-functional requirements, and support. Each section surfaces issues that are sometimes not considered in ICT projects or do not clearly fit into the structured sections that organise the main body of the document.

Costs

In ICT there are at least three types of costs to be considered: build, run, and project management.

Build cost

The build costs cover all expenses related to the establishment of the system. Depending on your current setup this could be the cost to modify your existing installation to make it ready for the additional indicators, or it could be the cost to establish a new system if this is warranted. If you are to extend an existing system, researching the implementation cost for the old system might overestimate the resources needed. If you are to build a new system, the implementation cost of the old system might be a first indicator about what costs to expect, particularly if you plan to rebuild exactly like before.

Run cost

Once the system is built it still needs to be run. Many projects neglect or underestimate the cost for running a system. This entails making the system technically available, which is mostly called operating a system, but it also includes what it will take to maintain the system and keep it up to date. Operation in turn consists of hosting, connecting, supporting users (think help desk), providing contact persons, and making the system available to the users in general.

Maintenance addresses where the system might need updates. Even if you do not plan to change anything with your system, you will need to bring your system up to current levels due to bug fixes of the underlying infrastructure (think operating system and database security bugs) or solution components (think specific application programming interfaces). In fact, experience shows that most systems will need at least minor adjustments regarding functionality – it is almost impossible to integrate everything into a system design, even if you use agile project approaches. So, plan for a safety belt of funds which you can use to round off the angles

of the system and complement what has not been considered. 10% of the implementation cost is a common estimate for such post-implementation activities.

Project management

Do not forget about project management when you are estimating costs. Good project management is the pivotal cornerstone for a successful ICT project. Consider if you want to proceed with an initial full specification (e.g., Waterfall model) or if you want to be able to keep things moving during implementation (e.g., agile approach like SCRUM). Your choice should be guided by two principles:

1. cost allocation considerations and
2. specification abilities of the stakeholders and your team.

An initial full specification requires the whole team to think through everything from the first idea to the last bolt. It allows you to nail down the cost before any implementation. Experience shows that human brains are not very good at thinking about everything in a theoretical process. If you opt for a full specification approach, plan for contingencies – at least 20%, better 30% are recommended.

When assembling the team be careful to include the various practitioners and end users of the data. Take the time to gather their User Stories, and document them (e.g., using unified model language). Only when you have captured the complete workflow and needs of all participants of the data value chain (as explained in section 6) will you be able to shape your project accordingly.

Data architecture

You should be very familiar with how the data for the indicators to be integrated will be captured and how the indicator results will be calculated.

What the indicator description and methodology documents tell you is how to implement the indicators into your organisation. The bigger your organisation is, the more likely it is that you will need to consider specific architectures and infrastructure. Not all existing cases can be covered in this document but stepping through sections 6 through 9 can help you in considering the different aspects which might be relevant to your organisation.

Availability and other non-functional requirements

While most reporting functionalities will be straightforward to understand and address there are also non-functional requirements which do require some attention. They are not specific to this solution and there is a huge selection of texts and textbooks out there. This section does not want to supplant any of it, but rather remind you about the points you should think about.

Availability: A system is only useful if available. While it is unlikely that you need anything like a 24/7 system, take the time to find out how available the system must be. Which outages are acceptable and make sure that you have corresponding service level agreements with the different providers (server, internet access, etc.)? Also, make sure to find out how fast your system is expected to be up and running after a fatal crash (think corrupted or failed disks). And do think about your backups – done already, right!?

Security/access: If you are a company located in the EU you should worry about General Data Protection Regulation (GDPR). Much has been written regarding it and more likely than not, you need not be overly concerned here, since your organisation has already set up the requisite protocols to manage personal and sensitive data. In addition to GDPR, it is important to review the data protection legislation and regulations for the jurisdictions in which you will collect data for the new indicators and prepare to adhere to them. It may require enlisting external support regarding this subject.

Data access: Do you have encrypted data flow throughout? Could someone from inside your organisation inadvertently get to the data by querying the network? Is it possible they could change the data you have spent much time and effort to collect and provide? Do you have an authentication and authorisation model in place which gives only named persons access to the data they should see, on a need-to-know basis? Do you need to consider hierarchical or regional aspects to data access (think regional coordinators or other regional work sharing in your organisation)?

Response time/batching: If you have a classical reporting system with indicators you likely will have nightly batching processes and a business intelligence (BI) layer for data calculation. Or you might not and have a fully dynamic data analysis and reporting layer which integrates data on the fly (congratulations!). Whichever approach you employ, do check if the existing model still fits the needs of the various users once the new data flows are running.

Hardware architecture: If you have a server planning in place then you can skip this point. Otherwise, this would be a time where you have to make up your mind about on-premises/hosted and bare metal/virtual servers. All have their advantages and inconveniences. If money is tight or investment budgets low, go for a virtual hosted solution. If you have more financial freedom and do not want your application to be impeded by others, go for a bare metal root or managed server. Think about what you want to do yourself and what others can do for you – these tedious OS upgrades don't really need you in person, do they?

Language: Maybe this has not come up yet and nobody is thinking about it, because everyone is excited about this nice new indicator reporting and analysis system. But do spend a minute thinking about it – how would you integrate a different language? Even if your management thinks they do not need it since you have your company language, there might still be websites with different languages needing language-dependent output.

Quantities/growth: Make sure that you have an idea of the quantity of data you will need to cope with. Would the system you are designing scale well? You do not want to start all over again, only because management has decided to double the number of indicators? As a rule of thumb, if you can handle a factor of 10 without problems (or just by increasing (virtual) processing power), you are on the safe side.

Support

Think about how you will be supporting the users of the system. You generally need 3 levels of support:

- **1st level.** This level handles all the trivial aspects of a system, like: "How can I connect?", "I forgot my password", "Why doesn't this work?". You could consider integrating the 1st level support of your new system into existing support structures if you have them already. Or you could take this as the cornerstone of such a structure if you don't have any. Or you could outsource (whole or in pieces), or you could charge 2nd level support with 1st level activities if you anticipate very low 1st level traffic – it all depends on your local circumstances.
- **2nd level.** Someday inevitably someone from management will ask a question like "Can you explain this number in my report?". This is when you will need 2nd level support. This support should have understood all the mechanics and the business logic, but also the data flow through your organisation and hence be able (at least in principle) to calculate all the indicators by hand from the data collected. People working on this level should be data-savvy and have some ability to extract data from databases to operate some spreadsheet magic on them and validate them in the process.
- **3rd level.** This is the level when the system wreaks havoc, or your 2nd level tells you that "There must be something wrong". You need the people who built the system or equivalent capacity to help you in such a situation. If you have developed the system in-house this will be your colleagues, otherwise it might be the provider of the solution or a specialised maintenance provider taking over the job. Think twice before running your system without such a support – while it is possible in principle (once the system runs correctly, there is no reason that this should change, after all), you might stumble when updating maintenance upgrades to the operating system or database layer and need their help. At lease ensure that you have case- or ticket-based access to 3rd level services.

For all support levels think about which response and resolution times you will need. Asking for too much service or too high service levels will increase and eventually even explode your support cost. So, choose wisely.

Since this is an indicator-based reporting system, chances are high that you do not need any high support level. Likely it does not change much if an indicator is reported one week too late – unless it is needed for the preparation of the corporate social responsibility section of your organisation's yearly report. Also, data capturers might get frustrated and lose data quality if they cannot use the system as planned when hunting for "their" data. Make sure to align with all system users and stakeholders to understand their needs. Establish a proposal and ultimately get clearance and buy-in from management.

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