SMART DELIVERABLE D5.4

Sustainability Assessment Guide

We study the barriers and drivers for market actors' contribution to the UN Sustainable Development Goals within planetary boundaries, with the aim of achieving Policy Coherence for Sustainable Development.

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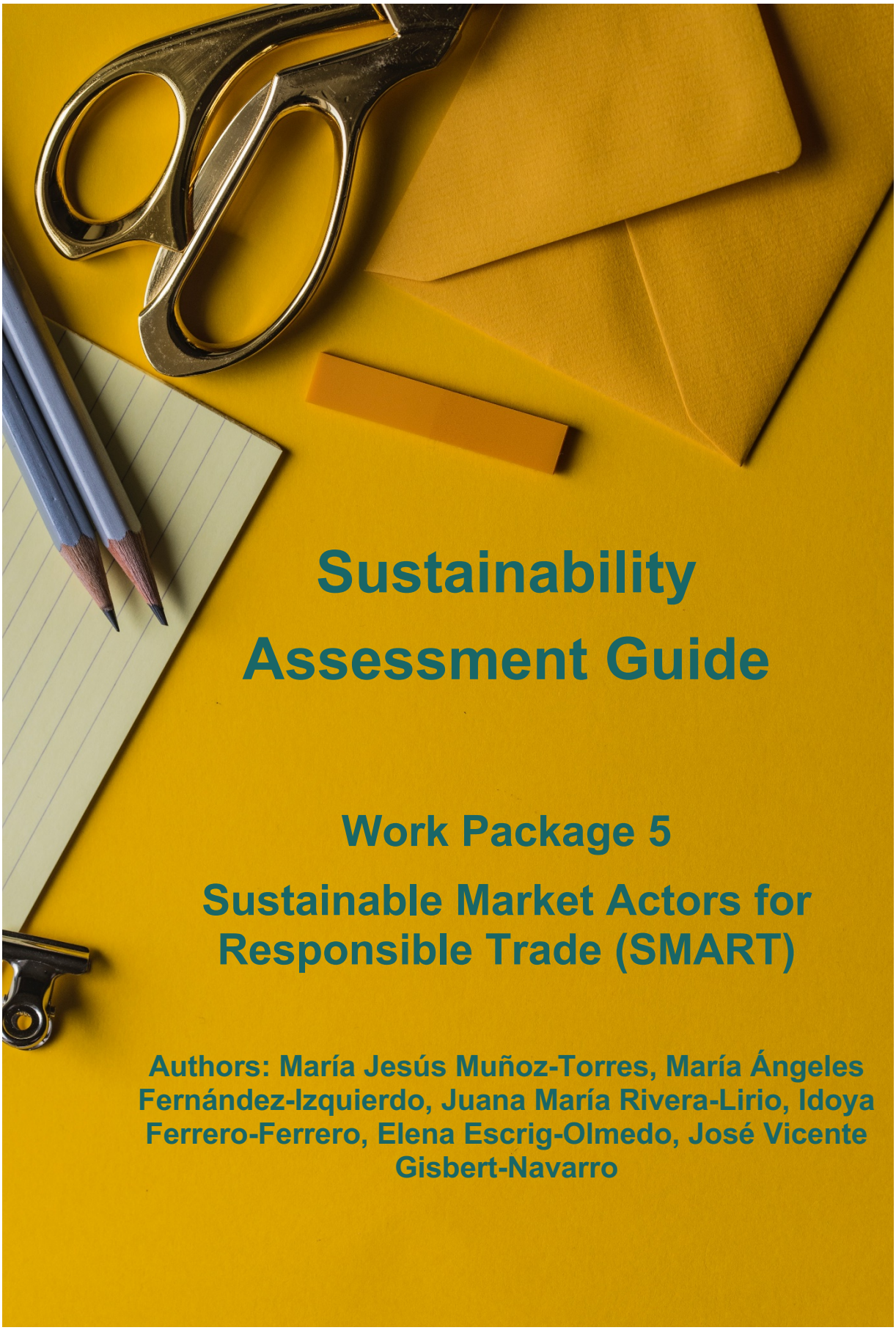

Sustainability Assessment Guide

Work Package 5

Sustainable Market Actors for Responsible Trade (SMART)

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Executive summary

Many companies claim they are operating in a sustainable way but verifying whether this is true can be difficult. There are many different definitions and opinions regarding what acting sustainably really means, and this makes it challenging to assess whether businesses are in fact operating in a way that is economically, socially and environmentally responsible.

Despite multiple efforts to turn sustainability assessments into accurate and universal tools, there is today no internationally accepted framework that integrates the whole sustainability principles, to be used when analyzing business operations. The SMART Sustainability Assessment Guide provides an integrative solution to these problems and contains a science-based framework for analyzing the extent to which companies are operating sustainably.

The Guide is based on knowledge developed as part of the Sustainable Markets for Responsible Trade (SMART) project, which is funded by the EU's research and innovation project Horizon 2020. Researchers from 25 institutions across the world are involved in the project, and together they are studying the barriers and drivers for market actors' contribution to the achieving the UN Sustainable Development Goals within the planetary boundaries.

The Framework is applicable to any kind of organization regardless of its size, structure, business area and location, and it is intended to be used to analyze the sustainable management of an organization within their supply chains under a life-cycle perspective. The Guide describes in detail how companies should analyze the sustainability of their operations by tracing the sustainability footprint back and forward, all along the value chain.

An organization that wants to ensure that its business operations are sustainable, should, as a first step, make sustainability a priority of its board and upper management. It should integrate sustainability into the organization's culture, mission, vision and values, and plan a strategy for how to become more sustainable. It should do this to demonstrate that it is strongly committed to creating sustainable value, meaning not just economic, but also social and environmental value. It should then position the organization within its supply chains and identify all its most critical points, and all its suppliers.

It is important that the organization also investigates its impacts along its supply chain, because a good or services produced by an organization with inputs from another organizations that are not operating in a sustainable way, cannot be considered sustainably produced. In order to analyze whether an organization is operating

sustainably, it is also need to integrate the operations of other firms further up or down the value chain. This will be done using environmental, social and economic footprints.

Footprint outputs will be integrated within hotspot analysis, where critical points will be identified. The organization will know which aspects of its operations need to keep a close eye on, and where it should introduce corrective measures to reduce its negative impacts.

Increasing globalization has meant that many products today travel across multiple borders before they end up in someone's home, and that they contain parts that are sourced from several different places and countries. For many products, this has made it increasingly difficult to trace every single step throughout the value chain. However, in order to ensure that the whole value chain of a product is sustainable, it is important that organizations ensure that it is possible to track a product or a component's path all the way from raw material to finished good.

This Guide also describes why it is important that organizations communicate to their internal and external stakeholders the environmental, social and economic impacts of their operations, and their goals for improvement. Organizations should ensure its stakeholders that they and their suppliers are operating sustainably. To do this, they need to communicate to them their environmental, social and management performance, and here they can, in order to increase their credibility, rely on external auditing. They should also communicate to their stakeholders their goals to manage change.

Organizations should aim for continuous improvement, meaning that they should work towards improving their sustainability practices, processes and performance over time. To do this, they should integrate the results and proposals for improvement of previous sustainability assessments into their sustainability strategy.

It is important that organizations are open about their sustainability performance because this can lower the risk of reputational damage in the event of disclosure of negative news about them, for examples by external parties or current or former employees. By disclosing information about their operations and their various impacts, the organization shows that it is transparent, responsible, striving to improve and is not trying to hide details about any wrongdoing from the public. Disclosing the facts about the organization's operations and their impacts is thus good risk management. By publishing information also about areas of its operations on which there is room for improvement, the organization demonstrates leadership, openness and accountability. It also shows that it is committed to making a positive contribution to sustainable development, and this can in turn lead to better dialogue with its stakeholders.

The SMART project has produced this Guide in order to support the EU and the global community in their work to tackle some of the most urgent problems facing the world

today. We hope that it will contribute to making businesses and other organizations more aware of their environmental and social impacts, so that they in turn will be able to change things for the better.

Glossary

Corporate Governance Management for Sustainability: is the application of managerial tools and mechanisms to the full range of governance needs, to govern at the highest level with the objective to achieve a more sustainable development.

Data: In terms of communication, data only describe a part of what happened, and do not include opinions or interpretations. Therefore, only data does not represent a solid base for the continuous improvement of measures and their implementation.

Footprint: A tool, which integrates a life cycle approach and defines a comprehensive range of environmental, social or economic impact categories that could be directly related, not only to the most significant global challenges, but also to every potential hotspot that a company or organization could manifest.

Framework: A basic structure underlying a system, concept, or text.

Global Reporting Initiative (GRI): A global standard for reporting social, environmental and economic information.

Guide: A document providing information on a subject.

Information: It has a meaning and shows significance, a purpose, and a form or style to connect with the public.

Organization Environmental Footprint - Organizational Boundaries: All facilities and associated processes that are fully or partially owned and/or operated by the organization and that directly contribute to the provision of the Product Portfolio.

Organization Environmental Footprint (OEF): European initiative to measure the environmental performance of an organization from a life cycle perspective based on fourteen impact categories: Climate change; ozone depletion; ecotoxicity - fresh water; human toxicity - cancer effects; human toxicity - non-cancer effects; particulate matter/respiratory inorganics; ionizing radiation - human health effects; photochemical ozone formation; acidification; eutrophication - terrestrial; eutrophication - aquatic; resource depletion - water; resource depletion - mineral and fossil and land use.

Organization Environmental Footprint Boundaries: Boundaries that shall be defined following a general supply-chain logic and which include site-level (direct) activities, upstream (indirect) activities and downstream (indirect) activities associated with the Organization's Product Portfolio. The OEF boundaries allow for the exclusion of downstream (indirect) activities as long as an explicit justification is provided.

Planetary boundaries: Environmental framework based on a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come.

Product: For the purpose of this Guide, product is understood not only as a commercially manufactured article but also a service.

Social Foundation: Social framework that presents the minimum social standards, which define the socially just space in which humanity can thrive.

SOGRES-MF Economic Footprint: SOGRES-MF is an initiative to measure the economic performance of an organization from a life cycle perspective that is based on six impact categories: business survivorship, taxes, efficiency, compliance, employment and inequality.

Sustainability Assessment Framework: A structure underlying the sustainability assessment system proposed by the H2020 SMART project. In specific cases, it is used acronym SAF.

Sustainability Assessment Tool: A step in the Sustainability Assessment Framework that integrates tools that measure the sustainability performance of an organization in terms of its environmental, social and economic impact, and the adequacy of its hotspot management. In specific cases, it is used acronym SAT.

Sustainability Principles: The principles form the basis to operationalize sustainability, which comprises a multidimensional perspective (environmental, social, governance and economic dimensions) with a balance between the different dimensions, an intergenerational perspective, the introduction of life cycle thinking and a process of dialogue and negotiation among different actors.

Sustainable Development Goals: The Sustainable Development Goals (SDGs) are an intergovernmental set of development goals that were adopted by all United Nations Member States in 2015. They have replaced the Millennium Development Goals. The SDGs are made up of 17 goals and 169 indicators.

System: A set of principles or procedures according to which something is done; an organized scheme or method.

Traceability: It is the process of identifying and tracking a product's or component´s path from raw material to finished good. It´s a practical approach for organizations to advance sustainability in global supply chains and prove claims and attributes of sustainable goods or services.

UNEP-SETAC Social Footprint: UNEP-SETAC is an initiative that measures the social performance of an organization from a life cycle perspective based on five stakeholder categories: workers/employees, consumers, local community, society and value chain actors (not including consumers).

PART I: Introduction to the Sustainability Assessment Guide

Presentation of Deliverable

Purpose and scope

This guide presents a logical framework to assess sustainability, integrating different well-known tools and processes, as well as others created specifically for this Framework. This is a manual of processes and tools for analyzing environmental, social, economic and governance factors to operationalize the assessment of the sustainable management of an organization within a life cycle perspective, on an annual basis. The main objectives of this guide are:

- To develop a Sustainability Assessment Framework for any type of organization to help managing businesses with the aim of making them more sustainable, within their supply chains, using expert knowledge.
- To provide a comprehensive Sustainability Assessment Framework that could be useful for other market actors and EU policymakers to make informed judgements.

Relationship to other deliverables

This Sustainability Assessment Guide is the fourth deliverable (D5.4 Report with the Sustainability Assessment Guide) based on the work developed by WP5. This deliverable presents a set of complementary tools and processes, which enables the comprehensive assessment of corporate sustainability performance, the Sustainability Assessment Framework.

This work is connected to previous deliverables, in particular, to Deliverable D5.1 “Life Cycle Thinking: Issues to be Considered” that presents this Framework and the foundations of this deliverable; D5.2 “List of Best Practices and KPIs of the Textile Products Life Cycle” and D5.3 “List of Best Practices and KPIs of the Mobile Phone Life Cycle”, which are complementary documents that support the implementation of this Framework.

This deliverable also feeds into Deliverable D5.5 “Proposal of Multi-Criteria Decision-Making Methodology to Assess the Supply Chain Management”, that provides technical information regarding the evaluation methodology (economic footprint and assessment method based on multi-criteria decision-making methodologies).

In addition, the results of D5.4 will flow into Deliverable 5.6 “Results of the Testing Process in the Selected Case Studies”.

Structure of the document

The objective of this guide is to develop a Sustainability Assessment System for organizations. To that end, this guide is structured in two parts.

In the first part, the fundamentals that have been used as a basis for the definition of the Sustainability Assessment Framework are presented

After a short introduction to the framework, in a second part, the Framework is presented in detail. First, the guide presents each of the three processes that operationalize the framework and second, it presents the three steps that conduct an in-depth analysis of the organization and the different tools proposed to assess sustainability.

1. Basic features

The basic values that underlie this Guide are:

1. *Universal:* The Guide must be applicable to any kind of organizations, for any activity, structure, size and in any geographical location.
2. *Quantitative*: Where possible, the results must be presented in a quantitative form for the purpose of enabling their best possible evaluation, homogenization and comparability. In some cases, and on some points, it will be qualitative.
3. *Flexible*: The Guide must be able to adapt to possible future changes in regulation without affecting its main purpose. The Guide is also flexible and scalable with respect to organizational complexity.
4. *Transparent*: Collecting information at the organizational level should allow for the evaluation of the individual elements that make up the organization.
5. *Dynamic*: In spite of having a primarily evaluating role, the guide's control and impact measurement features should be characterized by constant change, activity, or progress.
6. *Cost*: Implementation and management must be economically viable.
7. *Guarantee and credibility*: It incorporates mechanisms of guarantee and reinforcement of credibility from a quality assurance approach through internal and/or external audits and through the definition of sound data collection processes.
8. *Comparability*: The assessment outline of the Guide has been defined in order to reinforce the comparability of results among organizations. Moreover, it will incorporate a minimum content in the reporting as a reference for explaining the process and presenting the results of the evaluation.
9. *Standardization*: The Guide will indicate which standards have been used as reference in their definition.
10. *Comprehensiveness*: The Guide will consider the following flows along the life cycle of products: energy, material, information and financial.

2. Sustainability context

Consistent with the SMART Project, this Guide addresses the environmental, social and economic impact assessment integrating the natural science knowledge of the finite boundaries of the planet, the EU aim of a transition to a circular economy and the need to secure the social foundation for humanity, to establish the minimum economic, environmental and social standards. Sustainable development, which is required to achieve sustainability, is defined in the Anthropocene as "the development that meets the needs of the present while safeguarding Earth's life-support system, on which the welfare of current and future generations depends."[1]

As this Guide focuses on organizations, in order to extrapolate the all-encompassing concept of sustainability to their context, it is necessary to operationalize it, based on the four principles[2]:

The first principle refers to the three dimensions of sustainability (financial/economic, environmental, and social), and the balance among them. To strike a balance among the three dimensions, the positive results obtained in some of the dimensions cannot hide the poor results achieved in the other dimensions. This implies the integration of the three dimensions, not prioritizing one dimension over another. This principle justifies the selection of three footprints, one for each dimension of sustainability, and the design of an evaluation tool that provides a single sustainability footprint.

The second principle is based on the inter-generational perspective. This principle comprises the time perspective, which takes into account the long-term effects of today's decisions and a balance between both short- and long-term ones. This perspective implies identifying, evaluating, and managing the risks of current decisions concerning the needs of future generations, as well as planning for how future generations will be able to meet their needs.[3] From an operational perspective, the hotspots analysis tool

[1] Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, M. C., Shyamsundar, P., ... Noble, I. (2013). Policy: Sustainable development goals for people and planet. Nature, 495(7441), 305.

[2] Muñoz-Torres, M. J., Fernández-Izquierdo, M. Á., Rivera-Lirio, J. M., Ferrero-Ferrero, I., Escrig-Olmedo, E., Gisbert-Navarro, J. V., & Marullo, M. C. (2018). An assessment tool to integrate sustainability principles into the global supply chain. Sustainability, 10(2), 535.

[3] Boyle, C., Coates, G. T. K. (2005). Sustainability principles and practice for engineers. IEEE Technology and Society Magazine, 24(3), 32-39.

and the continuous improvement process allow organizations to evolve over a period of time and thus become more and more sustainable.

The third principle encompasses the stakeholder approach. Sustainability involves identifying the needs of current and future generations.[4] This is a complex, many-faceted approach, where business must find out how do its part. As an element in finding out how to create value within planetary boundaries in a way that contributes to meeting the needs of current and future generations, organizations should manage their relationships with clients, suppliers, governments, communities in which they are involved or on which they impact, representatives for the natural resources impacted by the business of the organization, and third-sector organizations, among others. Stakeholder engagement is a fundamental tool for understanding the needs, expectations, and interests of different stakeholders. The Sustainability Assessment Framework has a clear stakeholder approach (step one of the framework, hotspots analysis under step 2 and the step 3 reporting tool).

The fourth principle centers on the Life Cycle Thinking (LCT) approach. Sustainability involves a broad set of economic, environmental, and social responsibilities of decision-makers, which cross legal boundaries. In this regard, sustainability involves managing the impacts of upstream and downstream activities and, accordingly, the adoption of an LCT approach. Sustainability Assessment Framework addresses this challenge along the whole framework, not only defining the tools under this principle, but also proposing a specific process "traceability in the product's sustainable management", which stimulates the coordination with supply chain companies and the circularity of resource flows.

Sustainability, in this context, implies that companies and other organizations identify, assess and manage impacts and risks in all the echelons of the supply chain, taking into account upstream and downstream activities (circularity). This guide is aligned with the Circular Economy paradigm, where circular economy goes beyond organizational boundaries and considers upstream and downstream stages of a product's life cycle to

[4] World Commission on Environment and Development (WCED). World Commission on Environment and Development. Our Common Future. 1987. Available online: www.un-documents.net/our-common-future.pdf (accessed on 16 April 2019).

operationalize the circularity. Consequently, the LCT approach at the organizational level depicts appropriate units of analysis (organizations) in order to explore the integration of sustainability principles in the circular economy, as well as to examine the operationalization of these relationships.

3. Sustainability Assessment Framework

Framework necessity

Since the Paris Agreement on Climate Change in 2015 and the adoption of the UN Sustainable Development Goals (SDGs) in 2015, the EU Action Plan for financing Sustainable Growth in 2018[5] and the EU Directive on Non-Financial Information in 2014,[6] among other initiatives around the world to promote sustainability, the EU and the global community has been developing a new agenda on how to face the most urgent global problems challenging today's world. This Sustainability Assessment Framework is a science-based instrument and a contribution to achieving these goals and support international initiatives.

Despite the many efforts for turning sustainability assessment into accurate and universal tools, there is no internationally accepted framework that could be used by organizations, independently of their size or position in a product's life cycle, their type and nature, and that tackle the real environmental, social and economic concerns for society and the organization.

The corporate management of economic, social and environmental impacts without encompassing the cascade of impacts along the supply chain gives an incomplete and unrealistic picture of the organization's corporate sustainability. The Sustainability Assessment Framework has been designed to cover the assessment complexity of

[5] European Commission (2018): Communication from the commission to the European parliament, the European council, the council, the European central bank, the European economic and social committee and the committee of the regions, "Action Plan: Financing Sustainable Growth", COM/2018/097 final.

[6] Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups Text with EEA relevance

organizations along the whole supply chain and with a clear focus on connecting organizations' sustainability with the sustainability of their supply chains, taking into account not only direct impacts, but also upstream and downstream ones.

The fundamental purpose of this Guide makes sense when an organization considers that assessing only its traditional economic value is not sufficient, neither for getting a real picture of the organization, nor for managing business risks that necessarily pursue long-term success. In the last years, prevalence of environmental and social factors that could have a negative impact on the reputation and socio-economic variables, putting organizations at risk, have accelerated rapidly. Therefore, there is a need to adopt comprehensive Sustainability Assessment Framework and tools that contribute to the management system to reduce organizations' vulnerability to environmental, social and economic risks, allowing them to exploit the opportunities that lie within being competitive in addressing sustainability issues, thus helping them to strengthen their relationships with key stakeholders, and making a positive contribution to sustainable development.

Framework outline

The Sustainability Assessment Framework seeks to provide a manual of procedures for the assessment of the sustainable management of an organization from a life cycle perspective, on an annual basis, and analyzing environmental, social, economic and governance factors. To that end, this guide provides a sustainability assessment framework for an organization, considering that a life cycle assessment approach within a circular economy entails a reflection of the boundaries of the assessment.

This Sustainability Assessment Framework (Figure 1) presents three processes and three steps that offer a holistic system to ensure the success of the appraisal. The main characteristics of each of the processes and steps are described below:

Process 1: Traceability in the product's sustainable management: Interoperability mechanisms must be defined to ensure traceability. The framework should consider the

traceability of the sustainable management of products, which allows for the analysis of direct and indirect impacts of the organization, not only in environmental terms, but also in social and management terms, along their value chain. The use of sustainability clauses in the contracts of the supply chain and their communication through the entire production process, or the use of sustainable suppliers' certification programs are, among others, methods to assure this traceability.

Process 2: Assurance: The whole sustainability assessment process should contain enough guarantees to ensure that the information that comes out of the process is relevant, reliable and provides confidence to the different stakeholders. To this end, in this phase internal and external auditing processes should be defined.

Process 3: Continuous improvement: This guide also adopts a "continuous improvement approach", which implies that the organization must work towards improving its sustainability practices, processes and performance, leading to the gradual extension of the scope of the Sustainability Assessment Framework implementation over time; the gradual mitigation of negative impacts and the establishment of a more demanding sustainability objectives along time.

Step 1: Organization sustainability framework analysis: In this phase, the organization should 1) determine the commitment of the highest-level position in an organization, 2) connect corporate governance to sustainability, 3) know its objectives and scope, 4) position the organization within the supply chain, 5) be aware of its impacts throughout the life cycle, 6) define its supply chain map, 7) identify its stakeholders, 8) move forward in the evaluation process and, 9) plan the sustainability strategy.

Step 2: Sustainability assessment tool: This step comprises three phases:

Phase 1: Footprints tools: The framework offers footprint methodologies to identify and measure environmental, social and economic impacts. Grounded on best practices and aligning efforts with key initiatives, the Organizational Environmental Footprint from the European Commission and UNEP/SETAC methodology are used as tools to measure the environmental and social impacts to be adopted. For the economic footprint, this assessment tool proposes the use of the SOGRES-MF methodology (see SMART Deliverable 5.5).

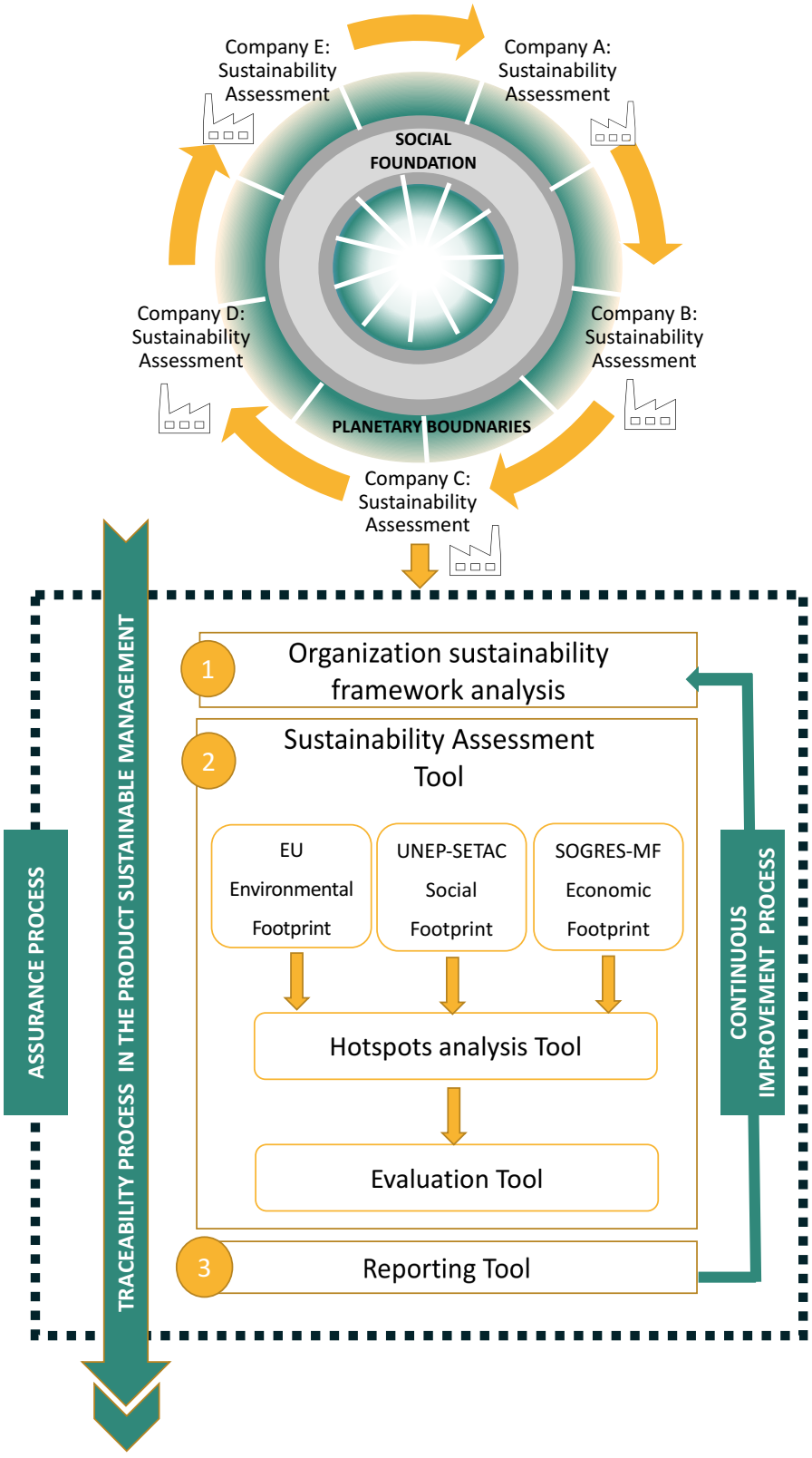
Phase 2: Hotspots analysis tool: In this phase, the critical points of the organization under evaluation are determined. These hotspots are obtained after the first evaluation of the organization and they are kept active all the time until their correction or suppression. To carry out this phase, the UNEP (2016) "Hotspots Analysis Overarching Methodological Framework" should be considered.

Phase 3: Evaluation tool: In the third phase, the results obtained in phases 1 and 2 are considered to evaluate sustainability performance. This evaluation is based on multi-criteria decision-making methodologies, which make it possible to overcome the current sustainability assessment limitations[7] , for example, that poor results in one aspect cannot be mitigated through better results in another aspect. The outcomes of this phase allow for the detection of the deficiencies that cause certain scores and the establishment of specific objectives for the improvement of sustainable management through the use of corrective measures. This phase provides organizations with the so-called sustainability footprint.

Step 3: Reporting Tool: In this step, organizations measure and communicate to internal and external stakeholders their environmental, social and management performance, and then set goals to manage change more effectively. Transparency about non-financial performance can help reduce reputational risks, open up dialogue with stakeholders, and demonstrate leadership, openness and accountability.

[7] Escrig-Olmedo, E., Muñoz-Torres, M. J., Fernández-Izquierdo, M. Á., Rivera-Lirio, J. M. (2014). Lights & Shadows on Sustainability Rating Scoring. Review Managerial Science, 8, 559-574.
Escrig-Olmedo, E., Muñoz-Torres, M. J., Fernández-Izquierdo, M. Á., Rivera-Lirio, J. M. (2017). Measuring corporate environmental performance: A methodology for sustainable development. Business Strategy and Environment, 26, 142-162.

Figure 1. General outline of the sustainability assessment framework



Framework Approach

This Guide is applicable to any organization regardless of its size, industry, location and legal form, and takes into account the context and particularities of each organization.

The implementation of this Framework depends on the organization's commitment, the availability of contextual information, and the degree of application of other commonly accepted sustainability tools (e.g. environmental, social and economic footprints). The tools and processes set out in the Sustainability Assessment Tool are our research-based recommendation. However, for organizations that already are using other equivalent tools, these should be evaluated up against the principles and processes we outline, to see if these give the organization the same kind of comprehensive overview and relevant and reliable results, consistent with the objective, scope and the basic principles of the Guide. If not, we suggest that the organization implements our Sustainable Assessment Framework, which can be done gradually, justifying this decision. In that sense, a continuous improvement process can be envisaged both for the implementation of a Sustainability Assessment Framework – gradually rolled out to encompass all aspects of the full life cycle of the organization's products (good and services) and processes – and with continuous improvement in the mitigation of negative impacts.

This Framework works towards improving sustainability practices, processes and performance. This implies gradually extending the scope of the Sustainability Assessment Framework implementation over time and to establish more demanding sustainability objectives.

PART II: Sustainability Assessment Framework

Process 1: Traceability in the sustainable management

Sustainability Assessment Framework shall improve the traceability of the sustainable management of organizations, which allows for the analysis of direct and indirect impacts of the organization, not only in environmental terms, but also in social and economic terms along their value chain.

In order to extend the traditional view of product life cycle concept to aspects other than environmental ones, such as social and economic aspects along the organization's value chain, Sustainability Assessment Framework integrates an approach based on the traceability of the sustainable management of products in the sustainable management of the organization. This integration requires, firstly, the definition of 'traceability' in the Sustainability Assessment Framework, according to the sustainability principles and, secondly, the exposure of the implications and requirements for assuring traceability in every Sustainability Assessment Framework step.

Based on ISO 9000:2015 Quality Management Systems and the United Nations Global Compact's (2014) 'Guide to Traceability'[8], traceability is defined in the Sustainability Assessment Framework as follows:

> Traceability is the process of identifying and tracking a product's or component´s path from raw material to finished good. It´s a practical approach for organizations to advance sustainability in global supply chains and prove claims and attributes of sustainable products.

The main purpose of traceability in a life cycle context is to connect different organizations through the flow of products knowing their origins, processing, distribution

[8] United Nations Global Compact and BSR (2014): A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains. New York, USA.

and location, thus relating their sustainability loads. Traceability contributes to reaching Sustainable Development Goal 12, 'Responsible consumption and production'.

Supply chain complexity often make it more difficult for companies to trace each and every step in the journey of a given product. Multiple actors with different systems and requirements may contribute to different production phases across international borders, and some areas in a supply chain may be especially opaque. This is a complex issue, as traceability requires the engagement and collaboration of actors along the entire supply chain to trace a product´s history. In this context, interoperability mechanisms must be defined to ensure traceability. In addition, the use of sustainability clauses in supply chain contracts and its communication through the entire production process is means to assure this traceability.

Procedures

Necessary information on manufacturers, suppliers, and distributors is recorded by the organization. This information is tracked throughout the whole process, from procurement of raw materials and parts to machining, assembly, distribution and sales to ensure that their histories can be traced.

Traceability can generally be divided into two parts (Figure 2): chain traceability and internal traceability.

i) Chain traceability: movement of products in multiple processes, and between organizations. It means that the history from procurement of raw materials and parts to machining, distribution and sales can be traced forward or backward. Organisations can monitor "where their products have been delivered to" (Trace forward), while organizations and consumers in the downstream can understand "where the products in their hands have come from" (Trace backward).

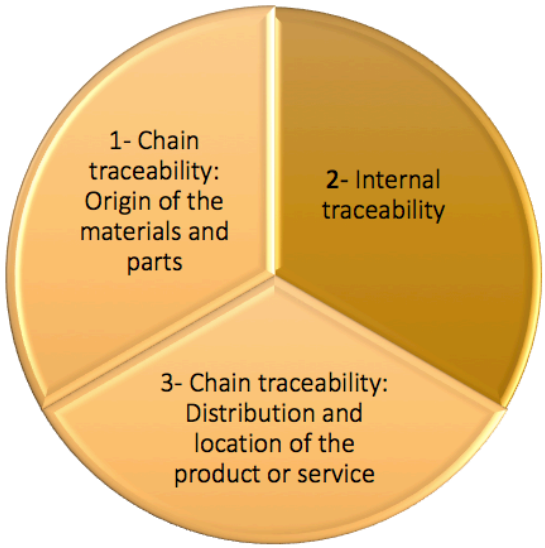
ii) Internal traceability: movement of products within a single process or organization. It implies monitoring the movements of parts or products within a limited and specific area in the whole supply chain, such as a single organization or a production plant.

On the other hand, in traceability, “trace forward” means using accumulated information to track the movement of products, and “trace back” means tracking records backwards in the timeline. Products are identified individually or in batch units to accumulate information in each step of the life cycle.

Trace forward: when a defect is detected in certain parts, products containing the parts and where the products have been delivered to, can be identified to recall them precisely. Products shipped to the market are identified. This process is effective to mitigate recalls and defective products.

Trace backward: when a problem occurs with shipped products, the relevant batch and process can be identified by tracing the manufacturing record to investigate the cause promptly. Causes are identified by tracing backward to the time of manufacturing. This process is effective to quickly identify and address problems in manufacturing processes.

Figure 2. Traceability procedures



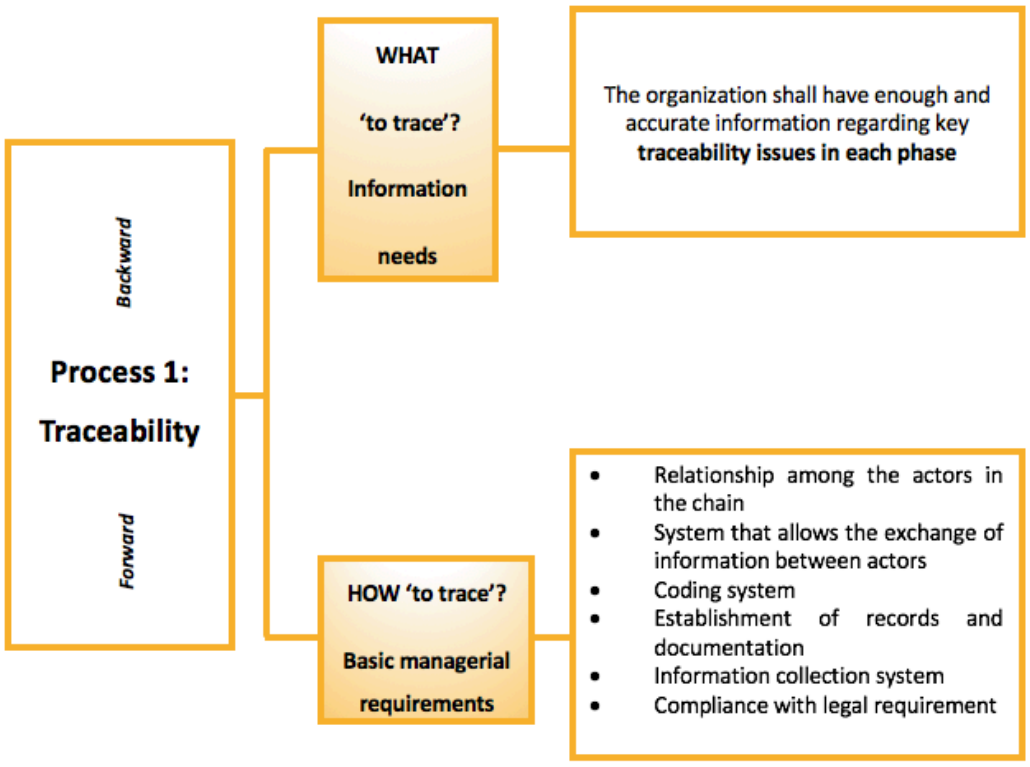
Traceability is achieved only when this information can be accessed and traced forward (tracking) and backward (tracing) at any time.

For the efficient and effective development of traceability processes, it is necessary to define accurate mechanisms. These mechanisms shall allow for every Sustainability Assessment Framework phase to meet their information requirements, regardless of the

origin of this information (other Sustainability Assessment Framework phases or other supply chain members). The Sustainability Assessment Framework Traceability process outline reflected in Figure 3 defines the need to have enough and accurate information regarding key traceability issues in each Sustainability Assessment Framework phase.

In addition, the organization shall implement basic managerial requirements (relationships among the actors in the supply chain, coding system, compliance with legal requirements, etc.) in order to ensure a proper traceability process performance.

Figure 3. Sustainability Assessment Framework Traceability process outline



Process 2: Assurance

The whole sustainability assessment process should contain enough guarantees to provide confidence and reliable information to the different stakeholders. To this end, in this phase internal and external auditing processes should be defined and established.

The objective of the Sustainability Assessment Framework assurance process is to obtain an accurate conclusion about the reliability of the Framework, in order to provide confidence and ensure reliable information to the different stakeholders regarding the sustainability assessment process performed.

This implies the development of a consistent assurance process, which analyzes, phase by phase, the fulfilment of the Sustainability Assessment Framework principles related to content and related to confidence in data quality and results (Figure 4).

Accordingly, each Sustainability Assessment Framework phase shall respect the Sustainability Principles defined in the Sustainability Assessment Framework sustainability framework: i) sustainability dimensions and the balance among them, ii) the inter-generational perspective; iii) stakeholder approach, and iv) life cycle thinking.

Further, as far as confidence in data quality and results is concerned, Sustainability Assessment Framework is based on the 'Four Key Factor Model for Credibility and Trust' in relation to Extended External Reporting (EER) proposed by the International Auditing and Assurance Standards Board (IAASB)[9]. An adaptation of this Model to the Sustainability Assessment Framework results in the following definition of the required factors: i) a Sound EER Framework, based on the integration of the Sustainability Principles and the application of advanced organizations sustainability management tools; ii) a strong Governance model, such as the Sustainability Assessment Framework

[9] Extended External Reporting (EER) Assurance IAASB Consultation Paper (February 2019).

governance framework; iii) consistent wider information, taking into account that data and information flow in cascade along each Sustainability Assessment Framework phase, and are integrated in a circular system of continuous improvement (a process of traceability supports this approach); and iv) External Professional Services and Other Reports, required in this case for the assurance reports associated to each Sustainability Assessment Framework phase.

Considering this framework, the Sustainability Assessment Framework assurance process requires a deep analysis of key issues in each Sustainability Assessment Framework phase ('*What is to be assured?*'), in order to guarantee consistency between the Sustainability Assessment Framework phases performed and the Sustainability Assessment Framework general framework.

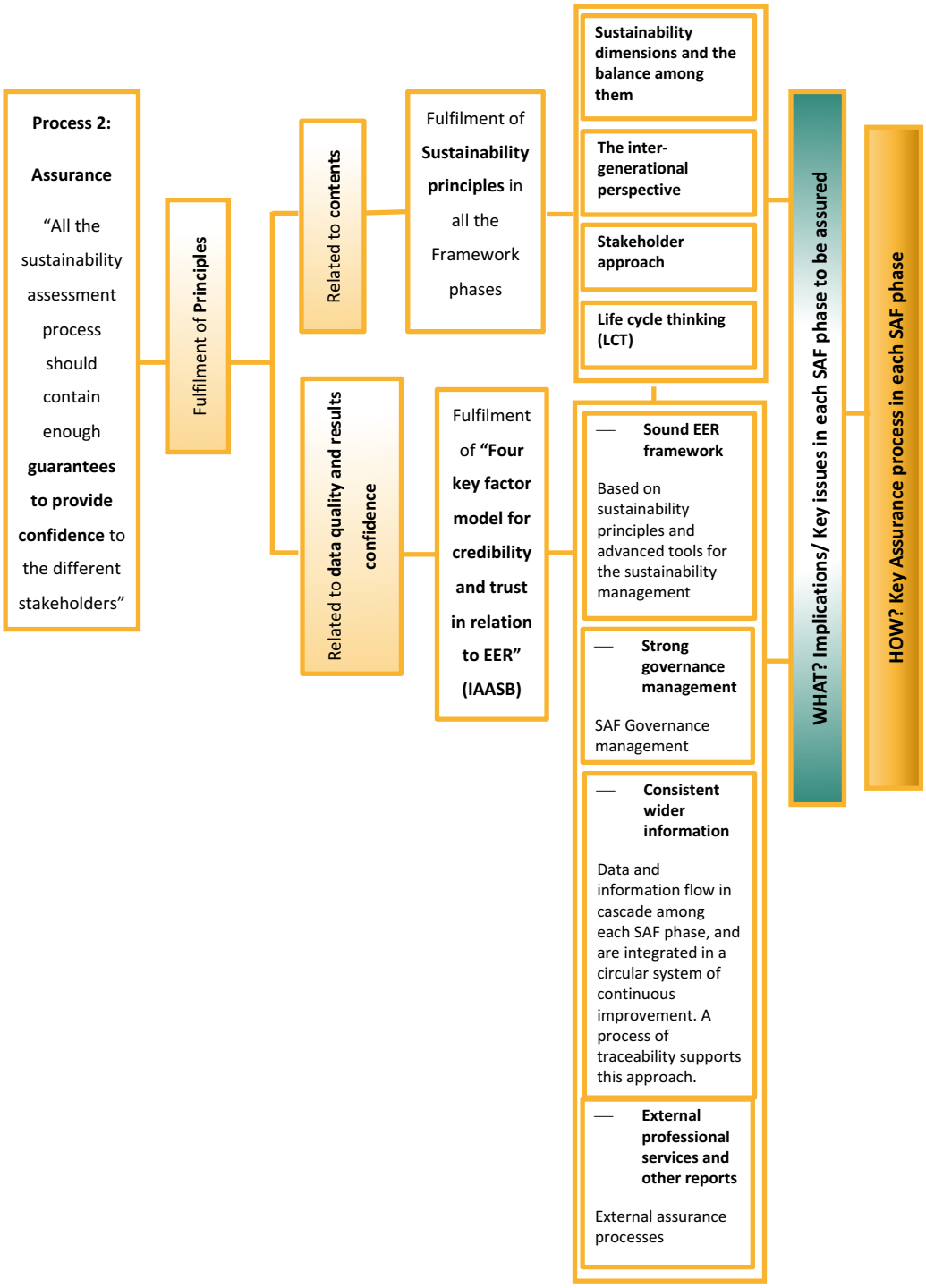
In addition, the Sustainability Assessment Framework assurance process includes an assurance methodology based on the most suitable available tool for each Sustainability Assessment Framework phase ('*How? Assurance tool in each Sustainability Assessment Framework phase*').

To implement this assurance process, the intervention of qualified and independent external assurance providers is required, who need to be accredited experts in the respective fields. The heterogeneity of issues to be assured could require the participation of different professionals. In this case, the assurance shall be performed by an external assurance providers' team, coordinated by a senior member.

The external assurance providers shall produce the required reports for each Sustainability Assessment Framework phase according to the assurance tool/methodology used and, on the basis of these specific reports, shall provide a Sustainability Assessment Framework assurance report. This final report, which will be released to all of the organization's stakeholders, shall contain the following information: i) identification of independent external assurance providers, who have developed the assurance process; ii) assurance process objective; iii) tools/methodologies employed during the process and in each Sustainability Assessment Framework phase (European OEF, ISO 19011: 2018, etc.); iv) specific assurance reports, the results of which will

underpin the final report; v) conclusion about the reliability of the Sustainability Assessment Framework developed; vi) recommendations to overcome potential weaknesses, and vii) technical limitations of the assurance process performed.

Figure 4: Sustainability Assessment Framework Assurance Process Framework



Process 3: Continuous Improvement

Sustainability Assessment Framework adopts a “continuous improvement approach”, which implies that the organization must work towards improving its sustainability practices, processes and performance, leading to the gradual extension of the scope of the Sustainability Assessment Framework implementation over time; the gradual mitigation of negative impacts and the establishment of a more demanding sustainability objectives along time.

The Sustainability Assessment Framework structure has been designed in a way that data and information flow in cascade along each Sustainability Assessment Framework step. These flows are integrated in a circular system of continuous improvement, supported by Process 2, Traceability. Consequently, both the Sustainability Assessment Framework processes and tools are performed under a dynamic sustainability management thinking, whereby the sustainability assessment contributes to positioning the organization in a global sustainable development strategy according to its sustainability impacts, but also reinforces the consistency and reliability of the organization’s sustainability management across time.

The integration of a continuous improvement management system in Sustainability Assessment Framework implies that outputs in each of the Sustainability Assessment Framework steps have a twofold objective: i) to allow the organization to perform sustainability assessment under Sustainability Assessment Framework definitions, and ii) to provide consistent and reliable information for a better sustainability assessment in the next period.

Under this premise, the operationalization of this continuous improvement approach in Sustainability Assessment Framework is based on the established management process “Plan-Do-Check-Act” (PDCA) cycle in an ongoing and recursive way.

Plan: Step 1- Organization sustainability framework analysis

In a continuous improvement cycle, the organization should integrate the results and improvement proposals of previous assessments, especially in its definition of objectives, scope, impacts throughout the life cycle, methodology for identifying stakeholders, and sustainability strategy.

Do: Step 2- Sustainability Assessment Tool

This continuous improvement process has several implications for the different Sustainability Assessment Tools: i) integration of continuous improvement in Sustainability Assessment Framework by means of a recursive technical review of footprint calculus, and; ii) integration of continuous improvement in Sustainability Assessment Framework by means of a recursive review of hotspots analysis and management.

In a continuous improvement context, hotspots management initiatives should be at least from two types: i) process Indicators (PIs), and; ii) best practices; both related to the impact categories identified as organization sustainability hotspots.

Check: Assurance Process and Step 3- Reporting Tool

The assurance process, implemented along all the Framework, provides confidence to the different stakeholders regarding the sustainability assessment process performed, including confidence related to the reliability and pertinence of the improvement proposals derived from Sustainability Assessment Framework development.

The relevance of reporting in a continuous improvement process is twofold: i) internally, it summarizes the results of all the Sustainability Assessment Framework developed, including weaknesses and future preventive and/or corrective actions to be considered, and; ii) externally, it provides transparency about non-financial performance, which can help open up dialogue with stakeholders and, as result, obtain issues to be considered in future Sustainability Assessment Framework processes.

Act: Step 1- Organization sustainability framework analysis in the future

Results derived from the application of Sustainability Assessment Framework should be considered by the organization in order to improve the application of Sustainability Assessment Framework in the next periods, including both positive and negative results in terms of sustainability, together with improvement proposals.

Step 1: Organization Sustainability Framework Analysis

Organisation Sustainability Framework Analysis (SUSTAINABILITY ASSESSMENT FRAMEWORK): in this phase, the organization should 1) determine board commitment; 2) connect corporate governance to sustainability; 3) know its objectives and scope; 4) position the organization within the supply chain; 5) be aware of its impacts throughout the life cycle; 6) define its supply chain map; 7) identify its stakeholders; 8) move forward in the evaluation process, and; 9) plan for the sustainability strategy.

With the aim of maximizing the potential benefits that the Sustainability Assessment Framework offers, this guide recommends that organizations carry out the recommendations included in the following subsections.

Determine board commitment

There is a need to adopt comprehensive Sustainability Assessment Framework to contribute to the management system to reduce organizations' vulnerability to environmental, social and economic risks, allowing them to exploit the opportunities that lie within being competitive in addressing sustainability issues, thus helping them to strengthen their relationships with key stakeholders, and making a positive contribution to sustainable development.

In this context, high-level management of the organization (corporate board or equivalent) should be strongly committed to the creation of sustainable value for their organization, which implies creating economic value together with environmental and social ones, striking a balance between the diverse interests and priorities of their stakeholders within the broader sustainability framework of the social foundation and planetary boundaries. Consequently, this guide highlights that the commitment of high-level management to sustainability principles is a prerequisite to effectively adopt and implement a genuine sustainability assessment.

With the aim of formalizing the organization's commitment to sustainability, this Guide recommends high-level approval of a sustainability statement with the following considerations:

(i) To establish sustainability as a board (or equivalent) priority;
(ii) To integrate sustainability in the organization's culture, mission, vision and values;
(iii) To allocate resources for developing proactive management decisions under the sustainability principles;
(iv) To set sustainability as a principle in the organization's objectives, strategies and the rest of practices and activities of the management system;
(v) To use sustainability metrics to evaluate the organization's performance;
(vi) To tie the compensation system to the sustainability performance;
(vii) To include sustainability issues in the internal training program for workers;
(viii) To involve key stakeholders in the assessment;
(ix) To report to stakeholders regarding environmental, social and economic impacts.
(x) To control periodically the effectiveness of the sustainability management system and adopt a continual improvement approach;
(xi) To promote an effective traceability system, and;
(xii) To commit to make all activities of the organization subject to an audit or external evaluation.

Connecting corporate governance with sustainability

This section proposes corporate governance management bases, which integrates sustainability into governance management, with the aim of achieving a more sustainable performance and showing how to run businesses in a more sustainable way. Sustainability Assessment Framework sets up a connector between corporate governance and sustainability management. In Sustainability Assessment Framework, corporate governance is understood as the system by which an organization is managed and controlled[10] and its stakeholder interests safeguarded. The corporate governance bases are divided into six action areas, which address critical issues in corporate governance and sustainability. These are based on state-of-the-art research[11] and are aligned with recent international recommendations regarding models of governance for sustainability[12] and for improving organizational performance.[13]

Figure 5 shows how to contextualize the six action areas in the organization's management system. Please, note that for those organizations that do not have a corporate board, the aspects regarding corporate board should be addressed in their equivalent body.

[10] Cadbury, A., (1992), The Financial Aspects of Corporate Governance (Cadbury Report), London, UK: The Committee on the Financial Aspect of Corporate Governance (The Cadbury Committee) and Gee and Co, Ltd. Available at: https://web.actuaries.ie/sites/default/files/erm-resources/243_financial_aspects_of_corporate_governance.pdf (last accessed 23 April 2019)

[11] Sjåfjell, B., & Munoz-Torres, M. J. (2019). The Horse before the Cart: A Sustainable Governance Model for Meaningful Sustainability Reporting. University of Oslo Faculty of Law Research Paper, (2019-04).

Fernández-Izquierdo, M.A.; Ferrero-Ferrero, I; Muñoz-Torres, M.J., (2019). Integrating Governance and Sustainability: A Proposal Towards More Sustainable Ports in European Port Cities in Transition (eds. Carpenter A. and Lozano R.), Springer, forthcoming.

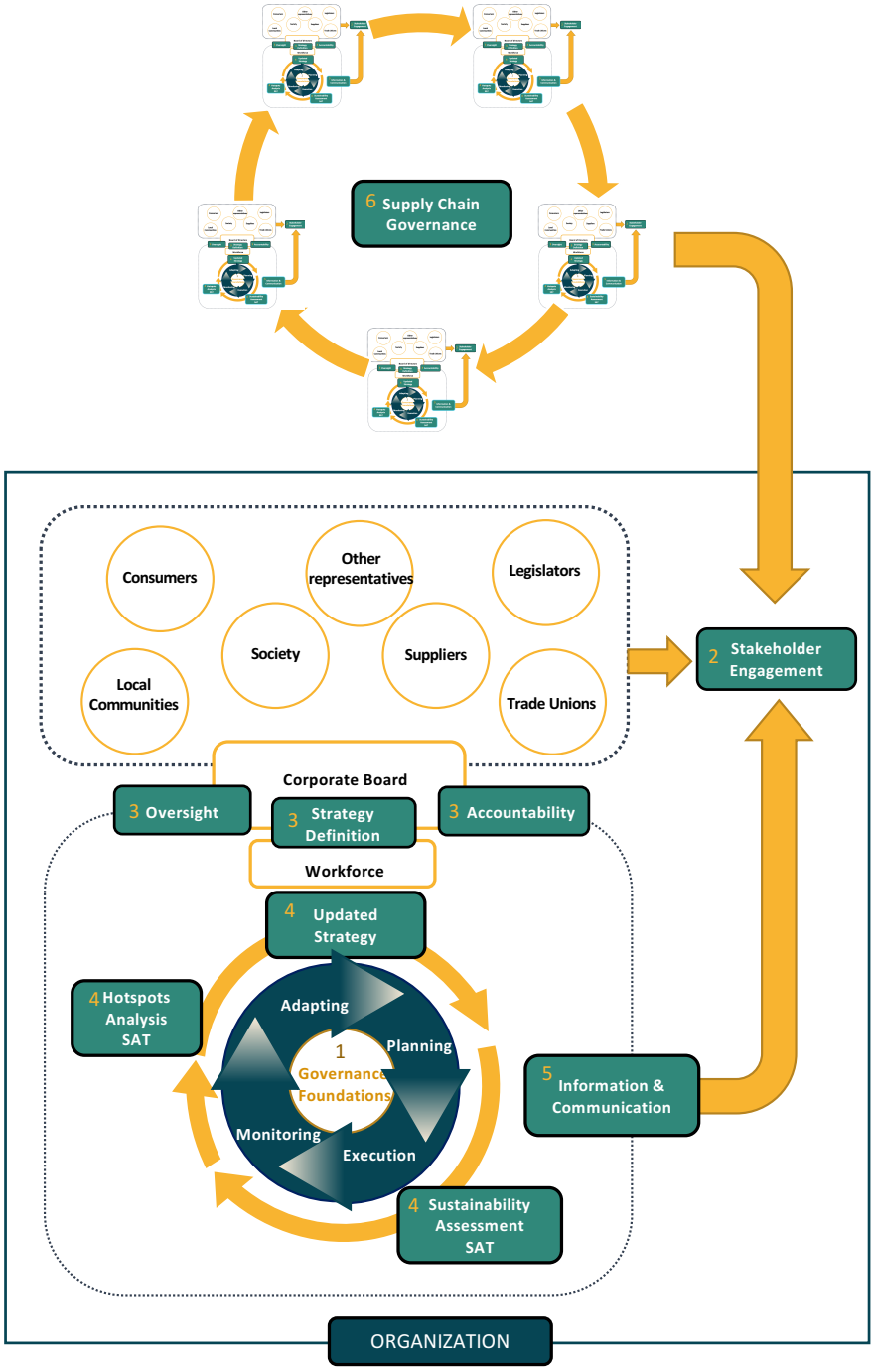
[12] Unepfi (2014). Integrated Governance: A New Model of Governance for Sustainability. Available at: https://www.unepfi.org/publications/investment-publications/integrated-governance-a-new-model-of-governance-for-sustainability-2/ (last accessed 15 November 2018)

Ceres (2018). System Rule: How Board Governance Can Drive Sustainability Performance. Available at: https://www.ceres.org/systemsrule (last accessed 13 March 2019)

[13] COSO - Committee of Sponsoring Organisations of the Treadway Commission (2014): Improving Organisational Performance and Governance: How the COSO Frameworks Can Help. Available at: https://www.coso.org/Documents/2014-2-10-COSO-Thought-Paper.pdf (last accessed 3 March 2019).

ISO – International Organisation for Standardization (2017): Sustainable procurement – Guidance. Switzerland.

Figure 5: Corporate Governance Management bases to run businesses in a sustainable way



1. Governance foundations. The starting point of a governance process for sustainability is to show true high-level commitment of to the sustainability concept. In this regard, the organization shall state its sustainability commitment in its mission and in the rest of elements that define and implement the rules of management includes the articles of

association, vision, board agenda, organizational strategy and, consequently, in the management cycle. The management cycle shall integrate sustainability risk and opportunities into all the elements of the dynamic process.

2. Stakeholder engagement. The organization shall ensure that stakeholder's views are encompassed in governance and management. In this action area, the organization shall follow a systematic methodology for identifying and prioritizing stakeholders (see Sustainability Assessment Framework step 1-1.7 Identify its stakeholders). The corporate governance bases address the issue of effective engagement with stakeholders by means of two types of involvement: at the board (or equivalent) and operational level.

At the board (or equivalent) level, the organization shall encourage the active participation of stakeholders at the highest level of the governance structure. In this respect, depending on the type of ownership of the organization and the model adopted, the mechanisms for the participation may differ. Some examples of best practices to involve stakeholders in decision-making process include, among others: (i) establishing stakeholder advisory panels, committees or groups of experts from a range of stakeholders; (ii) defining board members to represent stakeholder views; (iii) selecting board members on the basis of their special knowledge or experience of the local community and local economy, or; (iv) arranging an annual open meeting for stakeholders in order to put forward different questions to the board.

At the operational level, it is expected that stakeholder engagement in the management cycle implements informal pre-consultations, dialogues or consultation processes in the four management phases: (i) planning phase; (ii) execution phase; (iii) monitoring phase, and; (iv) adaptation phase.

3. Internal governance structure. Governance structure is understood as the architecture that supports the process of making decisions to manage the organization and oversee its activities. This structure should show a clear division of sustainability duties and responsibilities that are in keeping with power hierarchy and incentive systems. This implies that each of the internal actors of the organization (e.g. board of directors, executive managers and the rest of the workers) shall know what their duties and

responsibilities are and who they should be accountable to. Consequently, the organization shall inform about and train each internal actor on their duties, responsibilities, behaviors and appropriate practices for conducting their work.

The board (or equivalent body), as the highest-level management position in the organization, shall define the sustainable strategic plan, oversee sustainable management processes and be accountable for its decisions to all stakeholders. Clarifying and redefining the duties of the board at the core of the Sustainable Governance Model proposed by the SMART Project,[14] where we suggest that this should be a part of a company law reform.

4. Tools for board's due diligence. The corporate board (or equivalent body) should clearly define its role in addressing sustainability issues to make their organization more resilient and use the appropriate tools in order to integrate the environmental, social and economic risks in the decision-making process and in the management system. In this respect, boards shall adopt the technical results-oriented approach proposed by this guide. In particular, this science-based approach is provided by the "Sustainability Assessment Framework Step 2: Sustainability Assessment Tool (SAT)", which integrates footprint methodologies and key process indicators.

To exert an effective control to make organizations increasingly more sustainable, boards should assess whether or not sustainability hotspots (one of the results of the SAT application) are addressed in the updated organizational strategy. This shall be done on a regular basis in order to promote a continuous improvement culture across the board.

5. Sustainability information and communication. The organization shall communicate information about sustainability, both internally and externally. This sustainability information shall be comparable, complete, relevant and consistent with the sustainability principles outlined before in order to provide a true and fair view of the organization's sustainability aspects to stakeholders. The reported information must

[14] Sjåfjell, B., & Munoz-Torres, M. J. (2019). The Horse before the Cart: A Sustainable Governance Model for Meaningful Sustainability Reporting. University of Oslo Faculty of Law Research Paper, (2019-04).

comply with the requirements of the "Sustainability Assessment Framework Step 3: Reporting Tool", which gives details on the minimum content of reporting and on the process of assurance of the quality of information.

6. Governance mechanisms for the supply chain. The organization shall set mechanisms to minimize its exposure to opportunism and guarantee a sustainability management in the inter-organizational relationships throughout the supply chain. In this context, the organization shall foster, jointly with the rest of organizations implied in the supply chain, the best possible solution to ensure sustainability, taking into account impacts beyond organizational boundaries.

Sustainability Assessment Framework proposes the use of the following five types of governance mechanisms, among others: (i) a common inter-organizational sustainability framework agreement; (ii) sustainability criteria in purchasing/selling activities; (iii) contractual clauses on sustainability issues; (iv) problem-solving collaborations, and; (v) information sharing among the different actors of the supply chain.

Know the objectives and scope

The organization should identify the purpose of the sustainability assessment and its contribution to the global corporate strategy. In particular, the organization should answer the following questions:

(i) What is the reason for undertaking a sustainability assessment? / What are the expected benefits of this analysis?

(ii) How is this sustainability assessment going to contribute to the global corporate strategy?

(iii) What is the intended use of the results?

The organization should clearly establish the scope of the sustainability assessment. This implies defining the unit of analysis and the elements of the system to be included in the assessment. The sustainability assessment tool has been designed to expand knowledge on the environmental, social and economic impacts along the supply chain, i.e. direct and indirect impacts, considering upstream and downstream processes. In this context, the organization should also outline the boundaries of the assessment, justifying those elements of the system that will be excluded, as well as the assumptions and the limitations behind the analysis. These guidelines are applied in an organization and the boundaries of the assessment are defined by the supply-chain-logic including upstream and downstream activities.

Related initiative: Organisation Environmental Footprint (COM,2013: pp.122)

Requeriments for OEF estudies. *"The OEF boundaries shall be defined following general supply-chain logic. This shall include, at a minimum, site-level (direct) and upstream (indirect) activities associated with the Organisation's Product Portfolio. The OEF boundaries shall by default include all supply-chain stages from raw material acquisition through processing, production, distribution, storage, use and EOL treatment of the Product Portfolio (i.e. cradle-to-grave). All processes within the defined OEF boundaries shall be considered. Explicit justification shall be provided if downstream (indirect) activities are* excluded*."*

Source: European Commission (2013) "2013/179/EU: Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations", Text with EEA relevance Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013H0179 (Accessed on 25 February 2019) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013H0179

Nonetheless, if an organization has serious difficulties to collect the data of downstream activities, the organization could exclude the indirect impacts associated with upstream activities in the assessment. In this case, the organization should provide a clear explanation for this exclusion.

Positioning the organization within the supply chain

The sustainability assessment could be affected by context-dependent factors. For this reason, it is important that the organization specify the following information:

(i) Its activity sector and location. According to OEF[15] the sector should be defined with reference to the characteristic sectoral products portfolio (NACE Rev. 2 CODES). In the case of multisectoral organizations, all identifiable NACE codes relating to their product portfolio will be assigned. The location will be defined by the names of the countries where the organization operates.

(ii) The generic supply chain with locations and the stages of the supply chain, which the organization belongs to. This should include the full supply chain stages, including raw material acquisition, production and manufacturing, distribution, consumption, and end-of-life. For those supply chain actors for which transportation and design represent a cross-cutting activity and not the main activity of the organization, both activities could be integrated in all stages. The ideal setting for sustainability is within the design of a circular supply chain, whereby the resources are utilized as long as possible by reusing, repairing or remanufacturing products, components and materials, thus minimizing environmental, social and economic impacts.

Be aware of its impacts throughout the life cycle

An understanding of the organizational context and the impacts on nature, society and the economy of the organization activity helps carry out a more effective management. In this context, an organization should list the impacts or potential impacts of the products or waste across the life cycle that its activity generates. This fact helps the organization to be aware of the impacts beyond organizational boundaries, to identify opportunities, to respond to risks and to consider this information from the planning

[15] European Commission (2013) "2013/179/EU: Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations", Text with EEA relevance Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013H0179 (Accessed on 25 February 2019)

process onwards. This guide recommends using the results of the previous sustainability assessments as a starting point to list the impacts. Other approaches that could be useful for this end are:

(i) the analysis of megatrend reports about sustainability risks;

(ii) strengths-weaknesses-opportunities-threats (SWOT) analysis;

(iii) environmental, social and economic materiality assessment, and;

(iv) stakeholder engagement.

Define its supply chain map

With the aim of assessing sustainability beyond organizational boundaries, improving corporate sustainability, keeping risks at a minimum level and ensuring traceability, the organization should list direct (tier 1) and indirect suppliers (beyond immediate tier 1 suppliers), their location and the connection with the organizational activity. This supplier registration can be a complex process and it is recommended to use data management software as support.

Identify its stakeholders

The organization needs to consider the interests of those individuals or groups that affect or/and can be affected by the organization's activity, which are known as stakeholders. In this framework, the organization should engage with relevant stakeholders with the aim of contributing to:

(i) Ensuring that the material issues for sustainability assessment, management and reporting has been addressed (in the hotspots analysis, evaluation and reporting steps);

(ii) Decision-making processes, allowing the organization to widen the perspective to better understand the organization's context (in the integration of sustainability into the governance model);

(iii) Organizational improvements and innovations, collaborating with key stakeholders to solve common problems and sharing resources (within the continuous improvement approach), and;

(iv) Transparent stakeholder relationships, communicating to stakeholders all relevant environmental, social and economic information to consider in their decisions and actions (in the reporting step).

In this respect, the organization should define a systematic methodology for identifying stakeholders. The organization should move beyond engaging only with traditional stakeholders (e.g. shareholders or owners) and engage with other key groups (e.g. consumers, suppliers, communities or innovators). This framework proposes at least the identification of the stakeholders included in Table 1. If a particular stakeholder included in Table 1 was excluded, an explicit justification should be provided. The stakeholders are classified into internal or external actors. This classification will be connected to the internal or external reporting phases.

Table 1. Core Stakeholders

Stakeholders	Justification
Internal Stakeholders – They are part of the organization	
Shareholders, members or owners	High influence in the strategic decision-making process
Board (or equivalent body)	High influence in the strategic decision-making process
Executive Managers	High influence in the strategic decision-making process
Workers/employees*	High influence in the implementation of strategy and in the promotion of the organization culture and values

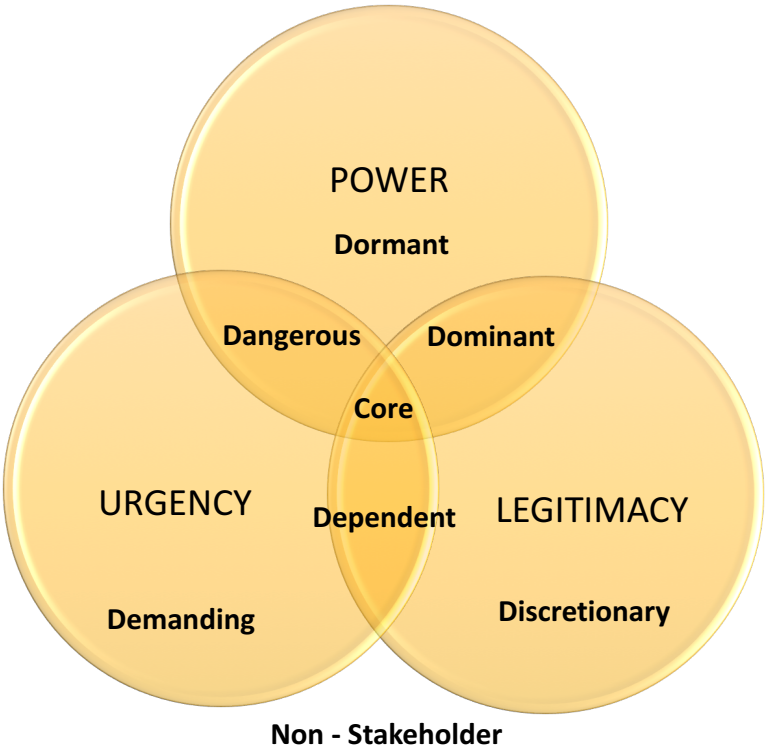
External Stakeholders – They are not a part of the organization	
Consumers*	High influence in the viability of the organization
Local Communities*	High influence in the social and natural resources that the organization uses
Society*	High influence in the reputation of organization and in the social license to operate
Value Chain actors (not including consumers)*	High influence in defining strategic or operational improvements and to run the organization with a long-term logic. E.g. Suppliers, B2B…
Creditors and other investors	High influence in the external financial resources
Legislators and regulators	High influence in defining sustainability policies and regulations

NOTE: *These stakeholders follow the stakeholder categories nomenclature of the Social Footprint

After identifying a pool of stakeholders, the organization should get to know the interests and expectations of stakeholders – via consultations, amongst others - and prioritize them to ensure efficient stakeholder engagement and make a strategic use of resources. Some tools have already been developed such as ranks or maps to detect, analyze and manage stakeholders' needs and expectations. These guidelines suggest the use of the Salience Model,[16],which uses three attributes to classify stakeholders: Power, Legitimacy and Urgency. Each stakeholder is assessed based on these three attributes. Figure 6 displays the seven types of stakeholders that could be classified in three groups depending on the number of attributes that each stakeholder has.

[16] Mitchell, R. K., Agle, B. R., Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of management review, 22(4), 853-886.

Figure 6. Classification of theoretical stakeholder based on Salience Model[24]



Accordingly, the organization should pay special attention to the "core" group (also known as definitive). In this case, the organization should ensure a greater alignment with the expectations of this group by developing mutually agreed solutions and making joint decisions. The next highest priority groups are the Dominant, Dangerous and Dependent groups (Expectant Stakeholders group), which require an active stakeholder participation in the planning, monitoring and assessment process of the sustainability strategy. The lowest priority group are the Dormant, Demanding and Discretionary groups (Latent Stakeholders group). In this case, the organization also should be held accountable and should know their needs and expectations and invite them to provide feedback to better develop its activity.

Move forward in the evaluation process

Sustainability Assessment Framework is based on the continuous improvement approach. In this context, the organization should institutionalize a culture of continuous improvement that entails moving forward on achieving sustainability, by setting increasingly more demanding environmental, social and economic targets, expanding the scope of the assessment and getting better and better at mitigating negative impacts.

Plan the sustainability strategy

Sustainability should be integrated into the organization's strategy and this strategy should be consistent with the culture, mission and values promoted by the organization. In the planning of the sustainability strategy, the organization should consider following issues:

(i) To map the short, medium and long-term plans to achieve the sustainability vision of the organization, considering risks and opportunities;

(ii) To identify the environmental, social and economic goals in order to make the organization more sustainable;

(iii) To apply stakeholder and expert knowledge to prioritize the goals and to define the action plan;

(iv) To develop a robust and consistent sustainability plan, that includes measurable targets and key performance and process indicators, and;

(v) To support sustainability training programs and staff compensation schemes with sustainability variables.

Organisation sustainability framework analysis- Traceability implications:

WHAT 'to trace'? Information needs

The organization shall have enough and accurate information regarding the following issues:

- **Objectives and scope** of the sustainability assessment;
- **Positioning** the organization within the **supply chain;**
- **Supply chain map;**
- **Stakeholders** identification and prioritization;
- **Sustainability strategy, and;**
- Sustainability **Governance Model.**

Organisation sustainability framework analysis- Assurance Implications:

What to be assured? Implications/ Key issues in this Sustainability Assessment Framework to be assured

1. The **board (or equivalent) commitment** refers to financial, environmental, social and governance issues.
The organization has defined **objectives** considering all the sustainability dimensions in a balanced way.
2. The organization has defined **objectives and planned the sustainability strategy** considering short term and long term effects of sustainability management in a balance way.
3. The organization has identified its **stakeholders** as: groups that affect or could be affected by the organization's activities, in the short or in the long-term, being aware of the **organization's position within the life cycle** and its impacts on sustainability along the whole supply chain.
4. The organization has **positioned itself within the life cycle** and has defined its **supply chain map**.

How? Assurance tool in this Sustainability Assessment Framework step

Assurance process: **based on ISO 19011:2018, Guidelines for auditing management systems.**

Organisation sustainability framework analysis- Continuous Improvement Implications:

In a continuous improvement cycle:

1. The organization should consider the **analysis developed by general management regarding the results of previous sustainability assessments**:

- after the Sustainability Assessment Framework performance in a previous period, the organization should have a **proposal of preventive and/or corrective actions** aligned with the sustainability assessment obtained and the weaknesses highlighted;
- on behalf of the general management, the technical, social and economic board should analyze the **technical, social and economic viability** respectively of these proposals;
- the **general management decides which proposals to implement.**

2. The **preventive and/or corrective actions and their respective best practices and key indicators approved by the general management, should be incorporated in the Sustainability Assessment Framework of the following periods along the entire framework**, **starting with the Organisation sustainability framework analysis (Step 1)**, and, through this first consideration, to improve the footprints calculus and hotspots analysis (Step 2) and reporting tools (Step 3) accordingly. This will allow the organization to learn again from its failures, stay aware of emerging risks and take advantage of new improvement opportunities.

Step 2: Sustainability Assessment Tool (SAT)

The aim of this step is to perform a comprehensive sustainability evaluation, using science-based metrics and tools (footprints, hotspots analysis and multi-criteria decision-making methods). The logic structure of this tools' system has been defined with the objective of supporting informed decisions with data on the organization's hotspots, on how to manage material impacts and on how to provide a synthetic sustainability indicator.

Phase 1: Footprints Tools

The footprint methodologies are a starting point to identify and measure environmental, social and economic impacts. A footprint could be defined as a tool which integrates a life cycle approach and defines a comprehensive range of environmental, social or economic impact categories that could be directly related, not only to the most significant global challenges, but also to every potential hotspot that a company or organization could manifest.

The framework offers footprint methodologies (from well-known initiatives or developed explicitly for this guide) to identify and measure environmental, social and economic impacts. Grounded on best practices and aligning efforts with key initiatives, such as the Organisational Environmental Footprint from the European Commission and the UNEP/SETAC methodology, as tools to measure the environmental and social impacts should be adopted. The Economic Footprint is a SMART Project proposal, based on different research and economic developments.

Environmental Footprint

From the environmental dimension point of view, this Guide proposes the use of the Environmental Footprint of Organisations (OEF) as a basic analysis procedure, and according to the document "Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations", especially in its annex III "Organisation environmental footprint guide".

The main objectives of the OEF method are the determination of environmentally critical points, benchmarking, business-to-business (B2B) communications and, fundamentally, the development of a common methodology for measuring an organization's environmental performance. To that end, the OEF defines different environmental footprint impact categories and impact categories indicators.

Environmental footprint impact categories refer to specific categories of environmental impacts considered in an OEF study. These categories are related to resource use or emissions of environmentally damaging substances, which may affect human health. Impact assessment models are used for quantifying the causal relationship between the material/energy inputs and emissions associated with organizational activities and each environmental footprint impact category considered. The environmental footprint impact assessment models used in the OEF are mid-point models, because these are considered to be scientifically sound. Mid-points methods assess the impacts earlier in the cause–effects chain. Table 2 shows the 14 default environmental footprints impact categories for OEF studies.

Table 2: Environmental Footprint impact categories and indicators

Impact Category	Impact Category Indicator
Climate Change	Tonne CO_2 equivalent
Ozone Depletion	kg CFC-11 equivalent (*)
Ecotoxicity – fresh water (1)	CTUe (Comparative Toxic Unit for ecosystems) (2)
Human Toxicity - cancer effects	CTUh (Comparative Toxic Unit for humans) (3)
Human Toxicity – non- cancer effects	CTUh (Comparative Toxic Unit for humans) (3)
Particulate Matter/ Respiratory Inorganics	kg PM 2,5 equivalent (**)

Ionising Radiation – human health effects	kg U 235 equivalent (to air)
Photochemical Ozone Formation	kg NMVOC equivalent (***)
Acidification	mol H+ equivalent
Eutrophication – terrestrial	mol N equivalent
Eutrophication – aquatic	fresh water: kg P equivalent marine: kg N equivalent
Resource Depletion – water	m3 water use related to local scarcity of water (4)
Resource Depletion – mineral, fossil	kg Sb equivalent (****)
Land Use	kg C (deficit)

Notes (European Union 2013: page 125)

Source: European Union[17]

Social Footprint

The Social Footprint (SF) is a measurement method that quantifies the social impact of an organization on people. Although there is not a widely accepted social footprint scheme, the Social Life Cycle Assessment (S-LCA) method (UNEP-SETAC, 2009, 2013[18]) could be understood as the most developed initiative to define the foundations of the SF. The S-LCA is a technique that aims to assess the social and socio-economic impacts (and potential impacts) of products along their life cycle based on the general guidelines of ISO 14 044. In the S-LCA, the starting point is to define the goal and scope, as well as to determine the functional unit of analysis. Although, it is important to note that S-LCA often works with semi-quantitative or qualitative data from characteristics of processes or companies, which cannot be provided per process or unit of output.

Focusing on the Life Cycle Impact Assessment, UNEP-SETAC (2009) summarizes the actions that should be carried out in three steps: (i) to select the impact categories and sub-categories, and the characterization method and models; (ii) to relate the inventory

[17] European Commission (2013) "2013/179/EU: Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations", Text with EEA relevance Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013H0179 (Accessed on 25 February 2019

[18] UNEP-SETAC (2013). The Methodological Sheets for Subcategories in Social Life Cycle Assessment (S-LCA). Available at: https://www.lifecycleinitiative.org/wp-content/uploads/2013/11/S-LCA_methodological_sheets_11.11.13.pdf (Last accessed on 17/05/2019)
UNEP-SETAC (2009). Guidelines for Social Life Cycle Assessment of Products. Available at: http://www.unep.fr/shared/publications/pdf/dtix1164xpa-guidelines_slca.pdf (Last accessed on 28/05/2018)

data to particular sub-categories and categories (classification), and; (iii) to determine and/or calculate the results for sub-category indicators (characterization).

With the aim of supporting the data collection phase of S-LCA, UNEP-SETAC (2013) provides methodological sheets with a broad range of indicators as examples for each sub-category, which are classified by stakeholder categories and can be aggregated in impact categories. The indicators are classified at two levels: generic data- which refers to country/region/sector level and specific data- which is based on organization-level data. Table 3 shows the list of indicators with specific data.

Table 3: Social Footprint sub-categories and indicators

Stakeholder categories	Subcategories	Indicators
Workers/employees	Freedom of association and collective bargaining	Employment is not conditioned by any restrictions on the right to collective bargaining
		Presence of unions within the organization is adequately supported (Availability of facilities to Union, Posting of Union notices, time to exercise the representation functions on paid work hours)
		Check the availability of the collective bargaining agreement and meeting minutes (e.g. Copies of collective bargaining negotiations and agreements are kept on file)
		Workers are free to join unions of their choosing
		Employee/union Representatives are invited to contribute to the planning of larger changes in the company, which will affect the working conditions
		Workers have access to a neutral, binding, and independent dispute resolution procedure
		Minimum notice period(s) regarding significant operational changes, including whether it is specified in collective agreements
Workers/employees	Child labor	Absence of working children under the legal age or 15 years old (14 years old for most developing economies)
		Working children younger than 15 and under the local compulsory age are attending school

		Children are not performing work during the night (an example of unauthorized work by the ILO conventions C138 and C182)
		Records on all workers stating names and ages or dates of birth are kept on file
Workers/employees	Fair salary	Lowest paid worker, compared to the minimum wage
		The lowest paid workers are considering their wages meets their needs
		Regular and documented payment of workers (weekly, bi-weekly)
		Presence of suspicious deductions on wages
Workers/employees	Working hours	Number of hours effectively worked by employees (at each level of employment)
		Number of holidays effectively used by employees (at each level of employment)
		Clear communication of working hours and time arrangements
		The organization provides flexibility
		Respect of contractual agreements concerning overtime
Workers/employees	Forced labor	Workers voluntarily agree upon employment terms. Employment contracts stipulate wage, working time, holidays and terms of resignation. Employment contracts are comprehensible to the workers and are kept on file
		Birth certificate, passport, identity card, work permit or other original documents belonging to the worker are not retained or kept for Sustainability Assessment Frameworkety reasons by the organization neither upon hiring nor during employment
		Workers are free to terminate their employment within the prevailing limits
		Workers are not bound by debts exceeding legal limits to the employer
Workers/employees	Equal opportunities/Discrimination	Total number of incidents of discrimination and actions taken
		Composition of governance bodies and breakdown of employees per category according to gender, age group, minority, group membership, and other indicators of diversity
		Ratio of basic salary of men to women by employee category

		Presence of formal policies on equal opportunities
		Announcement of open positions happening through national/regional newspapers, public job databases on the internet, employment services or other publicly available media ensuring a broad announcement
Workers/employees	Health and Safety	Number/ percentage of injuries or fatal accidents in the organization by job qualification inside the company
		Hours of injuries per level of employees
		Number of (serious/nonserious) Occupational Safety and Health Administration (OSHA) violations reported within the past 3 years and status of violations
		Presence of formal policy concerning health and safety
		Education, training, counselling, prevention and risk control programs in place to assist workforce members, their families, or community members regarding serious diseases
		Adequate general occupational safety measures are taken
		Preventive measures and emergency protocols exist regarding accidents & injuries
		Preventive measures and emergency protocols exist regarding pesticide & chemical exposure
		Appropriate protective gear required in all applicable situations
Workers/employees	Social benefits/Social Security	Evidence of violations of obligations to workers under labor or social security laws and employment regulations.
		Percentage of permanent workers receiving paid time-off
		List and provide short description of social benefits provided to the workers (e.g. health insurance, pension fund, child care, education, accommodation etc.)
Consumers	Health and Safety	Number of consumer complaints
		Presence of explicit code of conduct that protect human rights of workers among suppliers
		Quality of labels of health and safety requirements
Consumers	Feedback mechanism	Presence of a mechanism for customers to provide feedback

		Practices related to customer satisfaction, including results of surveys measuring customer satisfaction
		Management measures to improve feedback mechanisms
Consumers	Consumer privacy	Number of consumer complaints related to breach of privacy or loss of data within the last year
		Number of complaints by regulatory bodies related to breach of consumer privacy or loss of data within the last year
		Strength of internal management system to protect consumer privacy, in general
Consumers	Transparency	Consumer complaints regarding transparency
		Publication of a sustainability report
		Communication of the results of social and environmental life cycle impact assessments
		Certification/label the organization obtained for the product/site
		Non-compliance with regulations regarding transparency
		Company rating in sustainability indices
		Quality and comprehensiveness of the information available in the sustainability report or other documents regarding to the social and environmental performance of the organization
Consumers	End of life responsibility	Annual incidents of noncompliance with regulatory labelling requirements
		Do internal management systems ensure that clear information is provided to consumers on end-of-life options (if applicable)?
Local Community	Access to material resources	Has the organization developed project related infrastructure with mutual community access and benefit
		Strength of organizational risk assessment with regard to potential material resource conflicts
		Does the organization have a certified environmental management system?
Local Community	Access to immaterial resources	Annual arrests connected to protests of organization's actions
		Do policies related to intellectual property respect moral and economic rights of the community?

		Strength of community education initiatives
Local Community	Delocalization and migration	Number of individuals who resettle (voluntarily and involuntarily) that can be attributed to the organization's activities
		Strength of organizational policies related to resettlement (e.g. due diligence and procedural safeguards)
		Strength of organizational procedures for integrating migrant workers into the community
Local Community	Cultural heritage	Strength of policies in place to protect cultural heritage
		Presence/Strength of organizational programs to include cultural heritage expression/conservation in product design/production
		Is relevant organizational information available to community members in their spoken language(s)?
Local Community	Safety and healthy living conditions	Management and oversight of structural integrity
		Management effort to minimize the use of hazardous substances
		Organization efforts to strengthen community health (e.g. through shared community access to organization health resources)
Local Community	Respect on indigenous rights	Annual meetings held with indigenous community members
		Strength of policies in place to protect the rights of indigenous community members
		Response to charges of discrimination against indigenous community members
Local Community	Community engagement	Organizational support (volunteer-hours or financial) for community initiatives
		Number and quality of meetings with community stakeholders
		Strength of written policies on community engagement at the organizational level
		Diversity of community stakeholder groups that engage with the organization
Local Community	Local employment	Percentage of workforce hired locally
		Percentage of spending on locally based suppliers

		Strength of policies on local hiring preferences
Local Community	Secure living conditions	Number of legal complaints per year against the organization with regard to security concerns
		Number of casualties and injuries per year ascribed to the organization
		Management policies related to private security personnel
Society	Public commitments to sustainable issues	Complaints issued related to the non-fulfilment of promises or agreements by the organization by the local community or other stakeholders at OECD contact points or the Global Reporting Initiative.
		Implementation/signing of Principles or other codes of conduct (e.g. Sullivan Principles, Caux Round Table, UN Global Compact Principles, etc.)
		The organization has pledged to comply with the UN Global Compact principles and has committed to presenting yearly communications on progress
		Presence of mechanisms to follow-up on the realization of commitments
		Presence of publicly available documents as commitments or agreements on sustainability issues
Society	Contribution to economic development	Contribution of the product/service/organization to economic progress (revenue, gain, paid wages, R+D costs in relation to revenue, etc.)
Society	Prevention and mitigation of armed conflicts	NA
		Organization's role in the development of conflicts
		Disputed products
Society	Technology development	Investment in technology development/ technology transfer
		Involvement in technology transfer programs or projects
		Partnerships in research and development
Society	Corruption	Financial damages
		Formalized commitment of the organization to prevent corruption, referring to recognized standards.
		The organization carries out an anti-corruption program

		The organization installs or cooperates with internal and external control units to prevent corruption
		Written documents on active involvement of the organization in corruption and bribery; convictions related to corruption and bribery
Value chain actors (not including consumers)	Fair competition	Legal actions pending or completed during the reporting period regarding anti-competitive behavior and violations of anti-trust and monopoly legislation in which the reporting organization has been identified as a participant
		Membership in alliances that behave in an anti-competitive way
		Documented statement or procedures (policy, strategy etc.) to prevent engaging in or being complicit in anticompetitive behavior
		Employee awareness of the importance of compliance with competition legislation and fair competition
Value chain actors (not including consumers)	Promoting social responsibility	Percentage of suppliers the enterprise has audited with regard to social responsibility in the last year
		Presence of explicit code of conduct that protect human rights of workers among suppliers
		Membership in an initiative that promotes social responsibility along the supply chain
		Integration of ethical, social, environmental and regarding gender equality criterions in purchasing policy, distribution policy and contract signatures
		Support to suppliers in terms of consciousness-raising and counselling concerning social responsibility issues
Value chain actors (not including consumers)	Supplier relationship	Payments on time to suppliers
		Absence of coercive communication with suppliers
		Reasonable volume fluctuations
		Sufficient lead time
Value chain actors (not	Respect of intellectual property rights	Organization’s policy and practice

including consumers)		
		Use of local intellectual property

Note: This table does not constitute a complete list of the best indicators to use in a study, since appropriate indicators depend on study, goal and scope. Source: UNEP and SETAC (2013)

Economic Footprint

Businesses and industries could quantify their economic footprint by measuring their direct, indirect, and induced economic contributions (upstream and downstream in their supply chains and measuring positive and negative impacts), driving improvements along the value chain, at the international, national, state, county, and any other levels. The objective of the Economic Footprint is therefore to be aware of how economic and financial flows move, who in the supply chain extracts technological and financial rents; which way funds are transferred around the world and how companies shift accounting profits to low-tax jurisdictions, and also to consider the wage inequalities along the supply chains.

This Economic Footprint of an organization take into account the key societal economic impacts of the organization. The principal set of indicators are connected to direct and indirect economic impacts (GRI 2011[19]) and the proposed categories that address these are: business survivorship; taxes (fiscal elusion); efficiency; compliance; employment, and; inequality within the organization and along the supply chains.

Focusing on the Economic Impact Assessment, the Economic Footprint Annex summarizes the actions that should be carried out in three steps: (i) to select the impact categories and the methodology used to calculate them; (ii) to relate the inventory data to particular categories (classification), and; (iii) to determine and/or calculate the results for the category indicators (characterization). Similar to the other two footprints, the scope of this footprint has to be established during the footprint calculation.

[19] Global Reporting Initiative. (2011). Global reporting initiative G3.1 Guide

Under these premises, this guide proposes different indicators, based on the different sources showed in column 3 and six economic impact categories as detailed in Table 4. These economic impacts overcome the limits of the primacy shareholder approach, integrating questions whose scope go beyond organizational boundaries, taking into account the economic contribution of the organization to other stakeholders such as actors of the supply chain, employees and society.

Table 4: Economic Footprint impact categories and indicators[20]

Impact Category	Impact Category Indicators	Source
Business Survivorship	● Altman z-score	Altman (2000)
Taxes (fiscal elusion)	● Tax Rate= 1- ∑(effective tax rate/theoretic by country and product)	(Alstadsæter, A. et. al 2017)
Efficiency	● Environmental value added/ unit investment ● Direct R&D intensity ● Indirect R&D intensity	(ERIA, 2010)
Compliance (Noncompliance indicators)	● Monetary value of significant fines; ● Total number of non-monetary sanctions for non-compliance with laws and regulations; ● Number of internal procedures related to non-conformities of the compliance management system that have been a violation of the regulations or values of the organization; ● Number of external or internal claims related to compliance risks, and;	GRI (2011) and KPMG (2018)

[20] Itman, E. I. (2000). Predicting financial distress of companies: revisiting the Z-score and ZETA models. Stern School of Business, New York University, 9-12.

Alstadsæter, A., Jacob, M., & Michaely, R. (2017). Do dividend taxes affect corporate investment? Journal of Public Economics, 151, 74-83.

ERIAN (2011): Sustainability Assessment methodology for Biomass Energy Utilization for Small and Large Scale Initiatives: Lessons Learned from Pilot Studies in Selected East Asian Countries. ERIA Research Project Report 2010, No. 22. Available at: http://www.eria.org/publications/sustainability-assessment-methodology-for-biomass-energy-utilization-for-small-and-large-scale-initiatives-lessons-learned-from-pilot-studies-in-selected-east-asian-count/ (Last accessed on 17/05/2019)

Global Reporting Initiative. (2011). Global reporting initiative G3.1 Guide

KPMG (2018): Claves sistémicas en Compliance. Serie Compliance avanzado- 6. Available at: https://assets.kpmg/content/dam/kpmg/es/pdf/2018/05/claves-sistematicas-compliance.pdf (Last accessed on 17/05/2019)

Branca, T. A., Vannucci, M., & Colla, V. (2009). A KPI for Local Community Impact of the ULCOS technologies. Revue de Métallurgie, 106(9), 373-381.

OECD (2019), Income inequality (indicator). doi: 10.1787/459aa7f1-en (Accessed on 17 May 2019)

	● Number of adverse or almost-non-compliances news of the organization, related to compliance risks.	
Employment (direct and indirect)	● Local Employment category modified	T.A. Branca, M. Vannucci and V. Colla (2008)
Inequality (Income or benefit distribution along supply chain)	● Gini index modified	OCDE 2019

Source: Own creation

Footprint calculus-Traceability implications:

WHAT 'to trace'? Information needs

In order to develop a comprehensive impact evaluation process along the life cycle, the organization shall have enough and accurate information regarding the following issues:

- **Environmental footprint impact categories according to** the **European OEF** (EC, 2013)
- **Social footprint impact categories according to** the **UNEP/SETAC S-LCA methodology** (UNEP-SETAC, 2009)
- **Economic footprint impact categories according to the SoGReS-MF methodology**

Footprint calculus-Assurance Implications:

What to be assured? Implications/ Key issues in this Sustainability Assessment Framework to be assured

The organization has developed a comprehensive impact evaluation process along the life cycle:
1. Environmental footprint: The organization has used the **European OEF** (EC, 2013)
2. Social footprint: the organization has followed the **UNEP/SETAC S-LCA methodology** (UNEP-SETAC, 2009)
3. Economic footprint: economic and financial information has been elaborated following the **International Accounting Standards (IAS),** so that it is a fair representation of the financial performance and cash flows of an organization.

How? Assurance tool in this Sustainability Assessment Framework step

1. Environmental footprint: follow-up to the 'Requirements for OEF studies' regarding the footprint critical review (EC, 2013):
'Any OEF study intended for internal communication claiming to be in line with the OEF Guide and any OEF study for external communication shall be **critically reviewed** in order to ensure that:
— The methods used to carry out the OEF study are consistent with this OEF Guide (…) (and) are scientifically and technically valid;
— The data used are appropriate, reasonable and meet the defined data quality requirements;
— The interpretation of the results reflects the limitations identified;
— The study report is transparent, accurate and consistent.'

'Any OEF study intended for external communication shall be critically reviewed by at least one independent and qualified external reviewer (or review team).'

2. Social footprint: follow-up of the **UNEP/SETAC S-LCA methodology,** developing a **critical review process** which 'ensure that (UNEP-SETAC, 2009):
— The methods used to carry out the LCA are scientifically and technically valid;
— The data used are appropriate and reasonable in relation to the goal of the study;
— The interpretations reflect the limitations identified and the goal of the study; and
— The report resulting from the study is transparent and consistent.'

3. Economic footprint: economic and financial information **has been audited** with the general objective of obtaining evidence about whether they are a fair representation of the financial performance and cash flows of an organization, following the **International Standards on Auditing (ISAs).**
In addition, it has developed a **critical review process** of the calculation of the economic footprint impact categories, in accordance with social and environmental footprints critical review.

Footprint calculus - Continuous Improvement Implications:

Integration of continuous improvement in Sustainability Assessment Framework by means of a **recursive technical review of footprint calculus**:

- The footprint methodologies allow to identify and measure environmental, social and economic impacts. From a technical pint of view, previous calculus developed should be considered in every year assessment in order to overcome potential weaknesses.

These economic impacts overcome the limits of the shareholder primacy approach, integrating questions whose scope go beyond organizational boundaries, taking into account the economic contribution of the organization to other stakeholders such as actors of the supply chain, employees and society.

Phase 2: Hotspots Analysis Tool

The critical points of the organization under evaluation are determined. These hotspots are obtained after the first evaluation of the organization and they are kept active until their correction or suppression. To carry out this phase UNEP (2017) "Hotspots Analysis Overarching Methodological Framework and guidance for product and sector level application" should be considered.

Following UNEP (2017),[21] a hotspot could be defined as a life cycle stage, process or elementary flow which accounts for a significant proportion of the impact of the functional unit. To carry out this phase, the methodology of UNEP (2017) hotspots analysis should be considered. This method allows users to perform different actions connected to hotspots inquiry. To that end, the subsequent steps should be followed:

[21] United Nations Environment Programme (2017): Hotspots Analysis An overarching methodological framework and guidance for product and sector level application. Available at: https://www.lifecycleinitiative.org/new-hotspots-analysis-methodological-framework-and-guidance/ (Last accessed on 17/05/2019)

Step 1. Define goal and scope. Under this step organizations should align the purpose of the hotspots analysis with the Sustainability Assessment Framework phase 1: Organisation sustainability framework analysis, whereby the most relevant impact categories are identified in the environmental, social and economic footprints, the boundaries of the analysis, the resources required and the approach to stakeholder engagement.

Step 2. Gather data, seek expert advice. In this phase organizations have to collect, organize and analyze data from Sustainability Assessment Framework phase 2: Footprints calculus.

Step 3. Identify and validate hotspots. Under this step, the hotspots associated with the unit of analysis should be identified. Considering the technical information of the previous step and the expert knowledge of the project team or working group – that should hold regular formal and informal meetings to define the scope of each impact on the different phases of the life cycle – a consensus on the environmental, social and economic footprints impacts considered as critical points should be achieved.

The criteria applied for identifying the sectoral hotspots follow UNEP (2017) and the Guidance for the implementation of the EU PEF during the Environmental Footprint pilot phase (European Commission, 2016),[22] where hotspots are elementary flows 'cumulatively contributing at least 50% to any impact category' before normalization and weighting. Table 5 shows the two key methodological steps in Hotspots Analysis and their associated key actions.

[22] European Commission (2016) "Product Environmental Footprint Pilot Guidance for the implementation of the EU Product Environmental Footprint (PEF) during the Environmental Footprint (EF) pilot phase". Version 5.2 – February 2016. Available at: http://ec.europa.eu/environment/eussd/smgp/pdf/Guidance_products.pdf (Accessed on 25 February 2019)

Table 5: UNEP (2017) Hotspots methodology

	UNEP (2017) Hotspots methodology
2. Gather data, seek expert advice	• Utilize both quantitative and qualitative sources of data. • Quantitative data may come from a variety of sources including: full or partial life cycle assessments, primary and secondary life cycle data (proxies if required), scientific reports, product or sector specific studies, market analysis, etc. • Qualitative information could come from non-technical reports or narratives from technical reports where data is not accessible. Qualitative inputs and semi-quantitative data may also come directly from conversations with experts and key stakeholders. • Document these inputs within a spreadsheet or software program and generate the results in a simple graphical output or matrix that would facilitate an understanding of the most significant life cycle impacts and also more easily facilitate discussion and decision-making, especially among non-technical stakeholders.
3. Identify and validate hotspots	• Assemble key stakeholders, in a project team or working groups and present the results of the previous step. • Engage these stakeholders in a facilitated discussion that encompasses the degree to which each impact identified occurs at each stage of the life cycle or value chain phase of the product or product category, or, as a result of specific sub-sector or sector-wide activities. • Solicit agreement from stakeholders on the degree of impact, and, based on collective expertise and professional judgement, either validate or adjust the degree of impact based on the

	feasibility of affecting change or reducing impact (i.e., influence of stakeholders, technical and commercial considerations, timing, cost, environmental and social impact trade-offs, etc.)

Source: UNEP (2017)

After this, the UNEP (2017) Hotspots analysis follows five steps (step 4 to step 8) that are connected to the next phases of Sustainability Assessment Framework.

Connected to the continuous improvement process that underlies the whole Sustainability Assessment Framework are the following UNEP Steps: Step 4. Respond to data and stakeholder gaps; Step 5. Identify and prioritize actions, where it should be necessary to identify and prioritize actions to eliminate or reduce the impact of the hotspots. This step is connected to the organization's proposals of PI and best practices; Step 6. Review and validate initial findings with key stakeholders & experts. In this phase, experts and key stakeholders should review the initial findings in order to ensure that the analysis is fit for purpose, and Step 8. Review and revisit hotspots analysis. In this phase, a method to ensure that hotspots and actions are revisited and updated periodically should be established.

The Sustainability Assessment Framework Step 3, Reporting Tool is connected to UNEP Step 7. Disseminate findings. This reporting tool implies the presentation and communication of findings to a wider audience.

Hotspots analysis tool - Traceability implications:

WHAT 'to trace'? Information needs

In order to develop a comprehensive hotspots analysis following the **UNEP-SETAC (2017), methodology** the organization shall have enough and accurate information regarding the following issues:

- **Environmental, social and economic impact categories assessments (SUSTAINABILITY ASSESSMENT FRAMEWORK-Footprint calculus)**
- **Organisation sustainability framework (life cycle, stakeholders, governance model, etc.) (Sustainability Assessment Framework Step 1)**

Hotspots analysis tool - Assurance Implications:

What to be assured? Implications/ Key issues in this Sustainability Assessment

The organization has developed a comprehensive hotspots analysis following the **methodology of UNEP-SETAC (2017).**

How? Assurance tool in this Sustainability Assessment Framework step

Following the **methodology of UNEP-SETAC (2017),** it has '**reviewed and validated initial findings with key stakeholders & experts'** (UNEP-SETAC STEP 6):
—'Provide written communication summarizing the results of (the) hotspots analysis, including proposed actions with all relevant stakeholders (…).
— Invite all stakeholders to provide written feedback, including validation of results and proposed actions, as well as recommendations.

Hotspots analysis tool - Continuous Improvement Implications:

Integration of continuous improvement in Sustainability Assessment Framework by means of **a recursive review of hotspots analysis and management**:

- Organisations **should manage their sustainability hotspots within a continuous improvement approach, considering**: i) the organizational sustainability framework (Sustainability Assessment Framework Step 1); ii) technical information (SAT footprint calculus) and iii) stakeholders' expectations and needs (SAT hotspots analysis).
- In this context, after the identification of sustainability hotspots in the SAT hotspots analysis, the organization should **analyze if it has appropriate hotspots management initiatives** in order to **prevent (preventive actions) and/or correct (corrective actions)** significant potential impacts.
- In a continuous improvement context, hotspots management initiatives should be at least two types: i) **Process Indicators** (PIs) and ii) **Best practices**, both related to the impact categories identified as organization sustainability hotspots.

Phase 3: Evaluation Tool - Sustainability Footprint

The results obtained in phases 1 and 2 of the SAT are considered to evaluate sustainability performance. This evaluation is based on multi-criteria decision-making methodologies (fully developed in SMART Deliverable 5.5 Multi-criteria Decision Framework to Assess Supply Chain Management), since it allows to overcome the current sustainability assessment limitations. The outcomes of this phase allow for the detection of deficiencies that cause certain scores and to establish concrete objectives for the improvement of sustainable management through the use of corrective measures.

The sustainability footprint should be elaborated considering the following key questions:

(i) **Sustainability Assessment Tool Inputs:** these inputs are obtained from previous phases of the Tool, i.e. phase 1 'Footprint' and phase 2 'Hotspots':

Table 6: Sustainability Assessment Tool Inputs

SAT PHASE	WHAT?	HOW?	WHAT FOR?
Phase 1 'Footprint'	Environmental footprint. Global environmental impact indicator	Impact categories normalized, weighted and aggregated according to European OEF (EC, 2013) developments.' Values: [0,1]	To include a synthetic indicator regarding the environmental domain in the sustainability footprint following generally accepted methods.
	Social footprint. Global social impact indicator	Impact categories normalized, weighted and aggregated according to UNEP/SETAC S-LCA methodology (UNEP-SETAC, 2009) developments. Values: [0,1]	To include a synthetic indicator regarding the social domain in the sustainability footprint following generally accepted methods.

	Economic footprint. Global economic impact indicator	Impact categories normalized, weighted and aggregated according to the SOGRES-MF methodology (SMART Deliverable 5.5) developments. Values: [0,1]	To include a synthetic indicator regarding the economic domain in the sustainability footprint following generally accepted methods.
Phase 2 'Hotspots'	Information regarding the most important impact categories and the life cycle phase where they take place.	Technical information validated by stakeholders and experts following UNEP-SETAC (2017) methodology. + Normalized, weighted and aggregated information for measuring if the organization has appropriate hotspots management initiatives (Process Indicators and best practices) in order to prevent and/or correct significant potential impacts. Values: [0,1]	Hotspots identification has implications for organizational management, but also for sustainability assessment. Both elements (current and future hotspots management initiatives) allow for a continuous process of improvement and would be a measure of the soundness of the organizational sustainability management system. Consequently, they will be considered in the evaluation phase.

(ii) **Method:** Fuzzy Multi-Criteria Decision-Making Method- Fuzzy Inference System (Mamdani type)

In addition, the system designed should overcome traditional sustainability assessment challenges[23]:

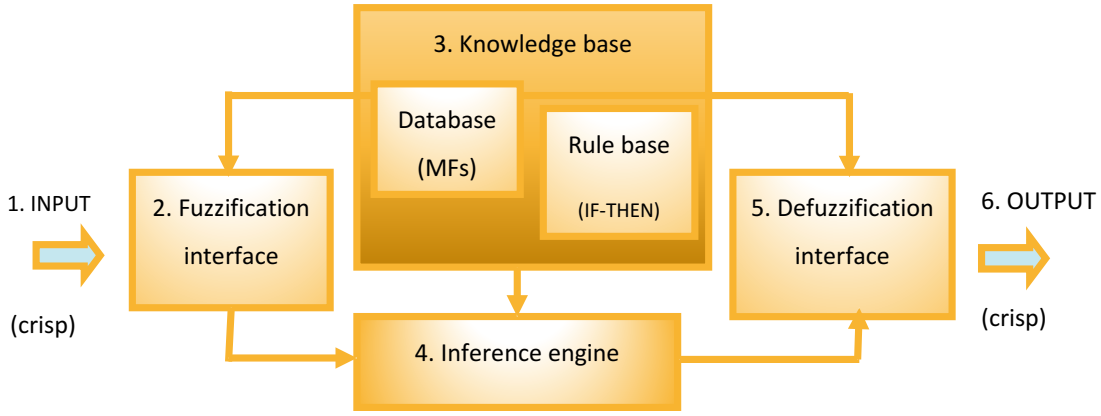
(iii) **Commensurability:** 'Selecting the key sustainability indicators, transforming them into commensurable units and integrating them in a single measure to generate a robust sustainability.' **(Derived from the calculation of Footprints in phase 1)**

[23] Escrig-Olmedo, E., Muñoz-Torres, M. J., Fernández-Izquierdo, M. Á., Rivera-Lirio, J. M. (2017). Measuring corporate environmental performance: A methodology for sustainable development. Business Strategy and Environment, 26, 142-162.

(iv) **'Fungibility:** In a strong sustainability context, good results in some of the indicators or domains cannot hide the absence or the inadequacy of policies or processes in other areas.' **(Integrated explicitly in the rule base)**

(v) **Stakeholders' preferences:** 'The varying assessments that different stakeholders may give to each criterion (should be) included. **(Derived from the consideration of Hotspots results phase 2)**

Figure 7: Fuzzy Inference System



The normalization, ponderation and aggregation of impact categories are optional phases still in progress both in the European OEF (EC, 2013) and in the UNEP/SETAC S-LCA methodology (UNEP-SETAC, 2009). The objective in the Framework is to apply these methodologies when established. Meanwhile, the Assessment Tool (see methodological annex) proposes an evaluation method that joins technical results with expert knowledge and which allow to work with qualitative and quantitative data. In this case, the sustainability footprint would be defined in linguistic categories. However, future developments of both the European OEF (EC, 2013) and the UNEP/SETAC S-LCA methodology (UNEP-SETAC, 2009) regarding normalization, ponderation and aggregation of impact categories, will allow to obtain a final score by means of the transition to a Fuzzy Inference System as shown in figure 7 (transition explained in SMART Deliverable 5.5).

Sustainability footprint tool - Traceability implications:

WHAT 'to trace'? Information needs

In order to obtain a SUSTAINABILITY ASSESSMENT FRAMEWORK-consistent sustainability footprint, the organization shall have enough and accurate information regarding the following issues:

- **Organisation sustainability framework (stakeholders, sustainability policy, etc.) (Sustainability Assessment Framework Step 1)**
- **Environmental, social and economic footprints (Sustainability Assessment Framework Footprint calculus tool)**
- **Organisation Hotspots (Sustainability Assessment Framework Hotspots analysis tool)**
- **Sustainability Management System of the Organisation (Process Indicators and Best Practices)**
- **Sustainability Governance Management Model**

Sustainability footprint tool - Assurance Implications:

What to be assured? Implications/ Key issues in this Sustainability Assessment Framework to be assured

The organization has applied a **fuzzy multi-criteria decision-making method, based on expert knowledge,** for the sustainability footprint calculation. The aggregation system designed should comply with scientific proposals (Escrig et al., 2017[1]):
—**Commensurability**: 'Selecting the key sustainability indicators, transforming them into commensurable units and integrating them in a single measure to generate a robust sustainability.'
— '**Fungibility:** In a strong sustainability context, good results in some of the indicators or domains cannot hide the absence or the inadequacy of policies or processes in other areas.'
—**Stakeholders' preferences**: 'The organization has engaged with different stakeholders in order to integrate their preferences and needs into the sustainability assessment process.'

How? Assurance tool in this Sustainability Assessment Framework step

Based on the 'Requirements for OEF studies' regarding the footprint critical review (EC, 2013), the elaboration of the Sustainability Footprint shall be **critically reviewed** in order to ensure that:
— The methods used to carry out the Sustainability Footprint calculation are consistent with Sustainability Assessment Framework and are scientifically and technically valid;
— The data used are appropriate, reasonable and meet the defined data quality requirements;
— The interpretation of the results reflects the limitations identified;
— The study report is transparent, accurate and consistent.

Sustainability footprint tool - Continuous Improvement Implications:

Integration of continuous improvement in Sustainability Assessment Framework by means of a **recursive technical review of sustainability footprint calculus**: from a technical point of view, previous calculus developed should be considered in annual assessment in order to overcome potential weaknesses.

Step 3: Reporting Tool

Organisations measure and communicate to internal and external stakeholders their environmental, social and management performance, and then set goals to manage change more effectively. Transparency about non-financial performance can help reduce reputational risks, open up dialogue with stakeholders, and demonstrate leadership, openness and accountability.

Sustainability in a sustainable circular economy context, also entails developing a communication system that helps companies to identify, assess and manage economic, social and environmental impacts and risks, in all the tiers of the supply chain, considering upstream and downstream activities and all the concerned stakeholders, within a research-based concept of sustainability.

Sustainable supply chain management addresses economic, environmental, and social features for the management of resources, information and capital flows along the supply chain. To develop a sound Reporting Tool, it is important to highlight the difference between information and communication. Information and communication together build identity, the sustainable corporate brand. It includes strategic vision, organizational culture and images of stakeholders.

In order to implement an appropriate stakeholder approach (see Sustainability Assessment Framework Step 1), the communication process needs to be designed to generate the highest level of engagement among companies along the supply chain (suppliers and clients) and consumers, governments at all levels, NGOs and any other stakeholder that the mapping process has outlined.

Finally, companies should communicate sustainability results to internal and external stakeholders. These results are associated with the environmental, social and economic performance. Internally, reporting contributes to setting goals, and managing risks and change more effectively. Externally, transparency about sustainability performance can

help reduce reputational risks, engage in dialogue with stakeholders, keep their engagement, and demonstrate leadership, openness, and accountability.

The minimum information requirements to fulfill the Sustainability Assessment Framework Reporting Step should provide reliable, comparable and accurate information for stakeholders in general. Reporting on sustainability means to measure and communicate the results performed by the organization about economic, environmental and social aspects in everyday activities in a clear and intelligible way. This sustainability reporting should also present the strategic values and the governance management.

In summary, the minimum relevant information about sustainability content, which the organization should report to their internal and external stakeholders, should cover the outputs from the different Sustainability Assessment Framework Steps and Processes:

- From Sustainability Assessment Framework Step 1, organization shall communicate the commitment to sustainability of the highest-level position in an organization, the governance managerial bases, objectives and scope of the report, shall show the position of the organization within its supply chains, the process followed to identify the key issues for the organization and stakeholders and the description of the business strategy with objectives and tracking metrics.

- From Sustainability Assessment Framework Step 2, the organization should provide intelligible information about its impacts. This means to present footprints and hotspots analysis results in an aggregate manner, highlighting the most impacting categories, and hyperlinking them with full footprints and hotspots technical reports.

- Sustainability Assessment Framework Step 2 also gives a groundbreaking sustainability score based on social, economic and environmental footprints and on hotspots management initiatives. The use of this Sustainability Assessment Framework sustainability footprint overcomes the current labels and sectoral standards, which have a more limited scope.

- Based on the assurance process, the report shall include the verification by a third party on non-financial information presented.

In addition, the report shall fulfil the principles of comparability, relevance, impact, robustness, completeness, accessibility and truthfulness.

Reporting tool - Traceability implications:

WHAT 'to trace'? Information needs

Sustainability Assessment Framework Report shall contain material information **regarding all Sustainability Assessment Framework Steps and processes** (traceability, assurance and continuous improvement) according to the Sustainability Assessment Framework .

Reporting tool - Assurance Implications:

What to be assured? Implications/ Key issues in this Sustainability Assessment Framework to be assured

The minimum information requirements to fulfil the Sustainability Assessment Framework Reporting step should **provide reliable, comparable and accurate information for stakeholders** in general. Reporting on sustainability means to measure and communicate the results performed by the organization about economic, environmental and social aspects in everyday activities in a clear and intelligible way. This sustainability reporting should also present the strategic values and the governance model.

How? Assurance tool in this Sustainability Assessment Framework step

Assurance process: **based on IAASB Extended External Reporting (EER) Assurance** (related to the current ISAE 3000).

Reporting tool - Continuous Improvement Implications:

The relevance of reporting in a continuous improvement process is twofold: i) **internally,** summarizes the results of all the Sustainability Assessment Framework developed, **including weaknesses and future improvements to be considered**; and ii) **externally**, transparency about sustainability performance can help to open up dialogue with stakeholders and, as results, to obtain issues to be considered in next Sustainability Assessment Framework developments.

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