

SMART DELIVERABLE

D5.3 List of best practices and KPIs of the mobile phone life cycle



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.

Project coordinator

University of Oslo

Project leader

Professor Beate Sjøfjell

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Lead beneficiary for this deliverable: Universitat Jaume I (UJI)	Dissemination: Public
Author list:	
María Jesús Muñoz-Torres	UJI
María Ángeles Fernández-Izquierdo	UJI
Juana María Rivera-Lirio	UJI
Idoya Ferrero-Ferrero	UJI
Elena Escrig-Olmedo	UJI
José Vicente Gisbert-Navarro	UJI
Research assistants:	
Icía García-Pérez	UJI
Aitor Salesa-Rubira	UJI
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Executive Summary

WP5 is developing the SMART – Sustainability Assessment Tool (SAT) that integrates sustainability principles in an assessment framework for business. In the design and the implementation of the SMART-SAT, two important elements are indicators (key performance indicators and process indicators) and best practices. In a SMART-SAT context, key performance indicators (KPIs) represent technical instruments to measure (quantitatively and qualitatively) environmental, social and economic impacts; key process indicators (PIs) are indirect quantitative measures of KPIs, focused on the measurements in a process or in a step of a process; and best practices are guidelines, rules, procedures, processes, actions, policies, programs, methods and innovative ideas that could implement a company to improve its sustainability performance.

In this regard, Deliverable 5.3 is focused on the analysis of indicators and best practices of the companies that belong to mobile phone life cycle with the main purpose of guiding mobile phone companies in: i) how to define and implement KPIs and PIs, and ii) how to define and use a set of best practices to comply with the continuous improvement process.

To do that, this deliverable has carried out an analysis of the state of the art regarding KPIs and Best Practices reported by 27 companies that belong to mobile phone life cycle, connecting them with the SMART – SAT.

This analysis shows limited information associated with the environmental, social and economic dimensions. The aspects linked to climate change, resource depletion, health and safety and social security of employees are the most advanced in the management systems of the explored companies.

From a life cycle perspective, a remarkable result is the disparity of information provided to the general public by the companies belonging to the different phases of mobile phone life cycle. This implies that decision makers could carry out a biased assessment based on the results of a company without considering the critical impacts generated in other life cycle phases.

To overcome this limitation SAT considers a comprehensive assessment structure comprised by KPIs associated with recognised footprints (Organizational Environmental Footprint from the European Commission and Social footprint from UNEP/SETAC S-LCA methodology). Although it is certainly difficult to define a standardized set of PIs that companies can adopt, this deliverable identifies the main features that PIs should comply with. In addition, the SMART-SAT aims to promote proactive organizations committed to a continuous improvement approach for sustainability. In this regard, a useful tool is the development and implementation of best practices, explicitly defined and consistently integrated in the management system of the organization. To do that, a necessary condition is the high-level of commitment of the organization, as the SMART Sustainable Governance Model proposes. The SMART Sustainable Governance Model is being developed in WP2 of the SMART Project, in close collaboration with WP5, which submits the current deliverable.

1. Introduction

In this section, WP5 presents the purpose and scope of this deliverable, connects the work carried out with other deliverables in the SMART framework and includes the structure of the deliverable.

1.1. Purpose and Scope

The concept of sustainability that WP5 employs involves a multidimensional perspective (with environmental, social and economic dimensions) and a balance among the different dimensions, an intergenerational perspective, life-cycle thinking and a stakeholder¹ approach. Therefore, the sustainability assessment cannot be just the result of a static picture of the company, one-dimensional and from the perspective of the most powerful stakeholder. These foundations of the sustainability concept have been identified as the sustainability principles (see Muñoz-Torres et al., 2018) and they should be considered in the sustainability assessment. In this regard, WP5 is developing the SMART – Sustainability Assessment Tool (SAT), which integrates sustainability principles in the assessment framework.

In the design and the implementation of the SMART-SAT, two important elements are indicators and best practices.

Regarding indicators, it is possible to identify two types: key performance indicators (KPIs) and process indicators (PIs). In a SMART-SAT context, KPIs represent technical instruments to measure quantitatively and qualitatively environmental, social and economic impacts and their main purpose is to measure footprint impact categories. Likewise, PIs are indirect quantitative measures of KPIs, focused on the measurements in a process or in a step of a process. Their aim is to provide information for the control and monitoring of objectives related to KPIs that allow a continuous improvement process.

¹ A stakeholder is a party that has an interest in a company and can either affect or be affected by the business decisions and actions.

Both types of indicators are also included in the information system and in the external and internal reporting process. Externally, they allow to communicate corporate sustainability performance and to compare the performance among companies.

Concerning best practices, they are understood as guidelines, rules, procedures, processes, actions, policies, programs, methods and innovative ideas that could implement a company to improve sustainability performance, which are integrated in the management system with the aim to be consistent with the continuous improvement process.

Deliverable 5.3 is focused on mobile phone sector. Consequently, it includes an analysis of sustainability indicators and sustainable best practices of mobile phone companies with the main purpose of guiding mobile phone companies in: i) how to define and implement KPIs and PIs, and ii) how to define and use a set of best practices to comply with the continuous improvement process. Both indicators and best practices should be in accordance with the principles of SMART-SAT.

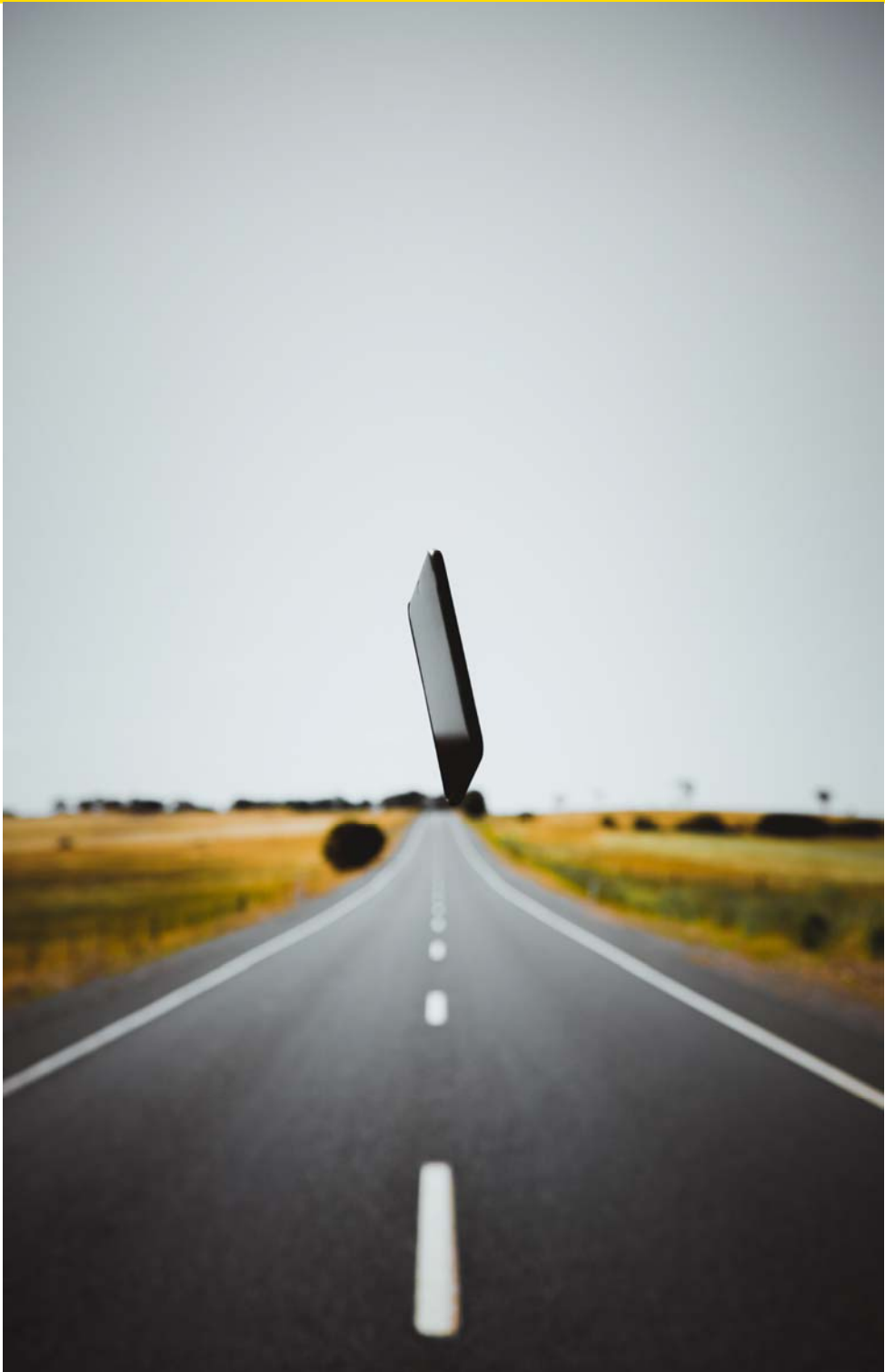
1.2. Relationship to other deliverables

This report is the second deliverable based on the work developed by WP5 and it is related to all other deliverables developed by WP5. In particular, Deliverable D5.1 (Lifecycle Thinking: Issues to be considered) presents the SMART-SAT 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) will share the common points that could be extrapolated to other sectors. Focusing on Deliverable D5.4 (Report with the Sustainability Assessment Guidelines), D5.3 will be a complementary document that supports the implementation of the SMART-SAT. This deliverable also feeds into Deliverable D5.5 (Proposal of Multi-Criteria Decision-making methodology to assess supply chain management) since the KPIs highlighted in this deliverable will be taken into account to apply the evaluation process using Multi-Criteria Decision-making methodology. In addition, the results of D5.3 will help us to identify the main lacks of information that we will be face with in Deliverables 5.6 (Results of the testing process in the selected case studies).

Deliverable 5.3 is also connected with other WPs, mainly WP4 which is focused on mobile phone. In this case, D4.1 (Sustainability Hotspot Analysis of the Mobile Phone Lifecycle) presents key global sustainability risks in the mobile phone industry and identifies key hot spots in environmental and social terms of the life cycle of two mobile phones: the composite mobile phone and the Fairphone 2. The main results of D4.1 have been taking into account to develop D5.3.

1.3. Structure of the document

This report is structured into five sections. After the introduction, the next part describes mobile phone life cycle. The third section presents the state of the art regarding KPIs and Best Practices reported by companies that belong to mobile phone life cycle. In the section two this deliverable connects KPIs, PIs and Best practices with the SMART – SAT and explains how to define and use these elements in the management system. Finally, in the conclusion, this report summarises the findings and reflects on the future developments of the project.



2. Mobile phone life cycle

This section details a generic structure of the main life cycle phases of mobile phones, according to the information analysed from different sources: i) academic literature, ii) sectoral guidelines and standards and iii) WP4 results, mainly D4.1 (Sustainability Hotspot Analysis of the Mobile Phone Lifecycle).

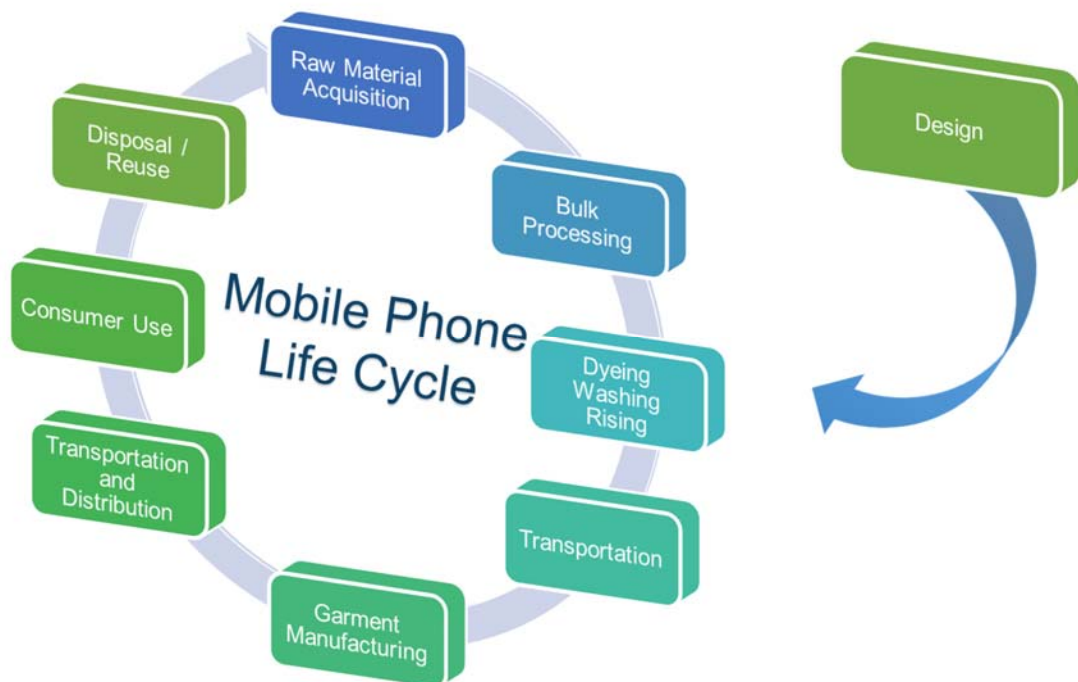
WP5 proposes nine phases that can be identified in a general mobile phone life cycle (Figure 1) on the bases of D4.1 results (see D4.1 - Sustainability Hotspot Analysis of the Mobile Phone Lifecycle, pages 22 for more detail). Note that the life cycle used in this deliverable differs slightly from D4.1 since WP5 explores mobile phone life cycle from the company perspective and given the complexity and heterogeneity of the companies that belong to manufacturing phase, WP5 has split up into four phases: Bulk processing; Engineered/ Speciality Material; Manufacture/ Assembly; and Transportation and distribution.

Figure 1 displays the nine phases of mobile phone life cycle, which are:

- **Raw material acquisition.** The first phase includes mining and preparation processes of non-ferrous metal ores.
- **Bulk processing.** The second phase refers to the activities of smelting, refining and the manufacture of metal alloys. It also includes the manufacture of plastic materials in primary forms.
- **Transportation.** The third phase represents the sea freight transport or rail bulk transport for the international movements of materials.
- **Engineered/ specialty material.** The fourth phase comprises the manufacture of: finished plastic products, electronic components, batteries, and photographic equipment and optical instruments.
- **Manufacture/ assembly.** The fifth phase involves the process of manufacturing and assembly mobile phone from its components in previous phases.
- **Transportation and distribution.** The sixth phase encompasses two subphases: transport to move the product to distribution centres or retail stores and the retail sale of mobile phone in stores.

-
- **Consumer use.** The seventh phase contains the user’s practices regarding the mobile phone.
 - **Disposal/reuse.** The eighth phase refers to recycling, recovery of sorted materials (plastic, electronic components and batteries) and treatment and disposal of waste.
 - **Design.** This phase could be considered a very first phase but concern all phases as much is decided by design. This is the reason that this phase is integrated in all phases of mobile phone life cycle, therefore, it has not been considered as a separate phase.

Figure 1. Mobile phone life cycle



3. Sustainability Key Performance Indicators (KPIs) and best practices. State of the art

This section presents the methodology carried out and the results obtained from the review of sectoral standards and guidelines and companies' public reports.

3.1. Methodology description

The methodology used to identify KPIs and best practices has been structured in the following steps:

Step 1: Presentation of WP5 Sustainability Assessment Tool (SAT), structure of environmental, social and economic footprints and impact categories.

Step 2: Identification of the most relevant companies in terms of sustainability in each life cycle phase considering the following criteria:

- Identification of the activity code of the companies in each life cycle phase.
- Identification of the best companies belonging to each activity code according to their sustainability score provided by Thomson Reuters ASSET4 database. Note that best companies means those companies with the highest sustainability score which is based on the self-reported information in the environmental, social and corporate governance dimensions.
- Consideration of additional sources like suppliers lists published by large companies, with the aim of validating the suitability of the selection.
- Application of a snowball methodology to extend the sample to other relevant companies in terms of sustainability not included in Thomson Reuters ASSET4 database.

Step 3: Analysis of public information about sustainability performance and practices of the companies selected in the previous step (Sustainability reports, Integrated reports, Websites, etc.). The data was collected during April, May and June 2018. This information is summarized at company level by the analysts and will be available upon request to project managers.

Step 4: Review of sectoral guidelines, standards and certifications used by companies as reference for the management of social, environmental and economic concerns in each life cycle phase.

Step 5: Categorization of the information according to the different environmental, social and economic impact categories defined in sustainability footprints of WP5 Sustainability Assessment Tool (SAT).

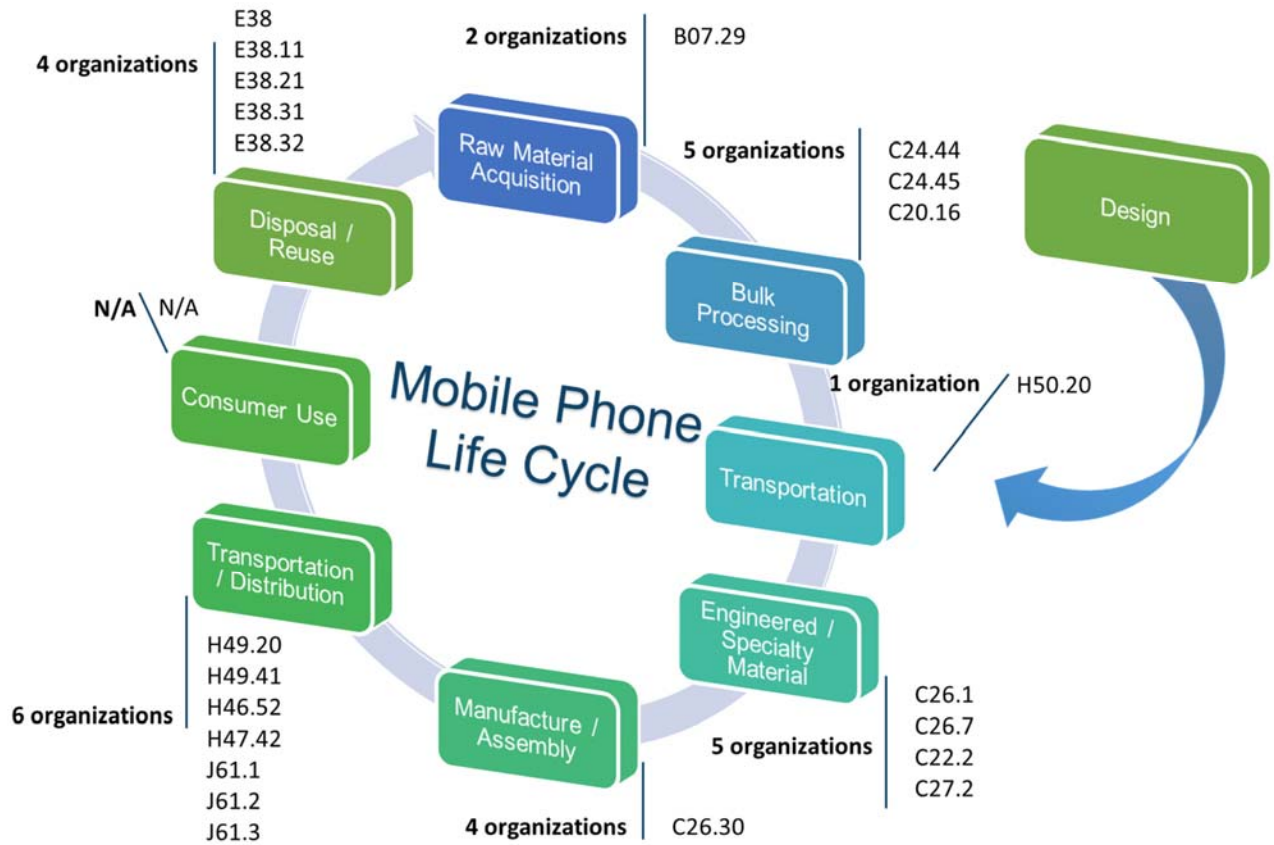
Step 6: Results analysis and discussion.

3.2. Results

This subsection presents the state of the art regarding environmental, social and economic KPIs and best practices implemented by companies, considering the whole mobile phone life cycle.

Figure 2 shows the economic activities associated with the mobile phone life cycle and the number of companies analysed by each life cycle phase. The total number of companies explored in this report is 27 (see Annex). This set of companies is heterogeneous in terms of size, legal form and geographical location. Note that there are not companies analysed in phase “Consumer use” since WP5 has not identified any company whose main activity is based on the use of mobile phones. Mobile phone is a communication tool widely spread in companies regardless the sector and the life cycle phase. In every company, the critical decisions concern the acquisition, use and disposal practices of its technological products. However, current corporate sustainability reporting does not allow isolating information related to this issue.

Figure 2. Number of organizations and economic activities analysed by mobile phone life cycle



The information of this subsection has been structured in two parts taking into account the impact categories of the footprints under the SMART-SAT framework. First, this report shows the analysis regarding KPIs and second, it presents the results concerning best practices. This information has been summarized in six tables according to the environmental, social and economic footprints, where the rows display impact categories and columns show the mobile phone life cycle phases.

3.2.1 KPIs and environmental, social and economic impact categories

Tables 1, 2 and 3 display the level of disclosure of specific indicators connected with the impact categories of the environmental, social and economic footprints. As an overall result, it is

remarkable a further development in the indicators associated to environmental and economic footprints and a lack of indicators associated with the social footprint.

Concerning the environmental footprint, the companies mainly define indicators related to “Climate Change” and “Resource Depletion – mineral, fossil”. In these two impact categories the most used indicators are related to CO₂ emissions, energy consumptions and waste generated. Regarding CO₂ emissions, the indicators are generally calculated using the concept of scopes (Scope 1 – Direct emissions, Scope 2 – Energy Indirect emissions and Scope 3 – Other indirect emissions).

With respect to life cycle phases, it is important to highlight that, in the first, the fifth and the eighth phases, all the impact categories are covered by indicators provided by at least one company. However, this coverage is partial, since companies have not developed indicators with a clear measurement of each impact category in its full scope. Moreover, companies belonging to the first phase present a greater consensus in terms of environmental aspects addressed in the reported indicators.

Table 1: Environmental Footprint impact category and company indicators

Impact Category	Life Cycle Phases							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Climate Change	Green	Yellow	Green	Green	Green	Green	Green	Green
Ozone Depletion	Yellow	Yellow	Green	Yellow	Green	Yellow	Yellow	Yellow
Ecotoxicity – fresh water	Green	Yellow	Red	Yellow	Yellow	Red	Yellow	Yellow
Human Toxicity - cancer effects	Green	Yellow	Red	Yellow	Yellow	Red	Yellow	Yellow
Human Toxicity – non- cancer effects	Green	Yellow	Red	Yellow	Yellow	Red	Yellow	Yellow
Particulate Matter/ Respiratory Inorganics	Yellow	Yellow	Red	Yellow	Yellow	Red	Yellow	Yellow
Ionising Radiation – human health effects	Yellow	Red	Red	Red	Green	Red	Yellow	Yellow
Photochemical Ozone Formation	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Acidification	Green	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Eutrophication – terrestrial	Green	Yellow	Red	Red	Yellow	Red	Yellow	Yellow

Impact Category	Life Cycle Phases							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eutrophication – aquatic	Green	Yellow	Red	Yellow	Yellow	Red	Yellow	Yellow
Resource Depletion – water	Yellow	Yellow	Red	Yellow	Green	Yellow	Yellow	Yellow
Resource Depletion – mineral, fossil	Yellow	Green	Green	Green	Green	Green	Yellow	Yellow
Land Use	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Yellow

- (1) Raw material acquisition
- (2) Bulk processing
- (3) Transportation
- (4) Engineered / Specialty Material
- (5) Manufacture / Assembly
- (6) Transportation and distribution
- (7) Consumer use
- (8) Disposal/reuse

- Green means that 100% of the companies in the sample define at least one indicator linked with the impact category.
- Red means that none of the companies define an indicator linked with the impact category.
- Yellow means any other possibility (that at least one company, but could be more, define an indicator linked with the impact category).

By contrast, phases three and six (“Transportation” and “Distribution”) show a little degree of coverage regarding environmental impact categories with the exception of above-mentioned “Climate Change” and “Resource Depletion”. A possible explanation of this result could be a lack of concern of environmental impacts of these companies along the product life cycle beyond the organizational boundaries if these impacts are not in the spotlight of the society.

With reference to social footprint, companies mainly provide indicators associated with “Workers/Employees” stakeholder category. In this category, the most common indicators refer to equal opportunities/discrimination, health and safety and social benefits/social security subcategories respectively. In particular, these indicators generally address the following aspects: gender diversity (in some cases classified by employee category), workplace accident and injuries indicators and hours of training.

With regard to the life cycle phases, the companies that more indicators publish are located in “Raw material acquisition”, “Engineered / Speciality material” and “Manufacture / Assembly” phases, which also provide some indicators concerning other stakeholder categories. For instance, indicators that could be highlighted are: in consumer category “Number of grievances”, in local community “Percentage of operations with implemented local community engagement programs”, and in value chain actors “Percentage of new suppliers that were screened using labour practices criteria”.

Table 2: Social Footprint sub-categories and company indicators

Stakeholder categories	Subcategories	Life Cycle Phases							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Workers/ employees	Freedom of association	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	Child labour	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	Fair salary	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	Working hours	Yellow	Yellow	Green	Red	Yellow	Yellow	Yellow	Yellow
	Forced labour	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	Equal opportunities/Discrimination	Green	Green	Green	Green	Yellow	Green	Yellow	Yellow
	Health and safety	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Green
	Social benefits/Social Security	Yellow	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow
Consumers	Health and safety	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	Feedback mechanism	Red	Red	Red	Yellow	Red	Yellow	Yellow	Yellow
	Consumer privacy	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	Transparency	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
	End of life responsibility	Red	Red	Red	Red	Yellow	Yellow	Yellow	Red
Local Community	Access to material resources	Red	Red	Red	Red	Red	Red	Red	Red
	Access to immaterial resources	Red	Red	Red	Red	Red	Red	Red	Red

Stakeholder categories	Subcategories	Life Cycle Phases							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Delocalization and migration	Yellow	Red	Red	Red	Yellow	Red	Red	Red
	Cultural heritage	Red	Red	Red	Red	Red	Red	Red	Red
	Safe and healthy living conditions	Yellow	Red	Red	Red	Yellow	Red	Red	Red
	Respect on indigenous rights	Yellow	Red	Red	Red	Yellow	Red	Red	Red
	Community engagement	Yellow	Red	Red	Yellow	Yellow	Red	Yellow	Yellow
	Local employment	Red	Red	Red	Yellow	Yellow	Red	Yellow	Yellow
	Secure living conditions	Yellow	Red	Red	Red	Yellow	Red	Red	Red
Society	Public commitments to sustainable issues	Red	Red	Red	Red	Red	Yellow	Red	Red
	Contribution to economic development	Yellow	Red	Red	Yellow	Yellow	Red	Green	Red
	Prevention and mitigation of armed conflicts	Red	Red	Red	Red	Red	Red	Red	Red
	Technology development	Red	Red	Red	Red	Red	Red	Red	Red
	Corruption	Yellow	Red	Red	Yellow	Yellow	Yellow	Red	Red
Value chain actors (not including consumers)	Fair competition	Red	Red	Red	Yellow	Red	Red	Red	Red
	Promoting social responsibility	Yellow	Red	Red	Yellow	Yellow	Yellow	Red	Red
	Supplier relationship	Yellow	Red	Red	Yellow	Red	Yellow	Yellow	Yellow
	Respect of intellectual property rights	Red	Red	Red	Red	Red	Red	Red	Red

- (1) Raw material acquisition
- (2) Bulk processing
- (3) Transportation
- (4) Engineered / Specialty Material
- (5) Manufacture / Assembly
- (6) Transportation and distribution
- (7) Consumer use
- (8) Disposal/reuse

- Green means that 100% of the companies in the sample define at least one indicator linked with the subcategories.
- Red means that none of the companies define an indicator linked with the subcategories.
- Yellow means any other possibility (that at least one company, but could be more, define an indicator linked with the impact category).

Focusing on the proposed economic footprint, the indicators are mostly associated with “Business Survivorship” and “Compliance”. In “Business Survivorship” impact category, the indicators are based on financing-accounting variables to measure economic impact (e.g. Revenue, Operating profit, and Cash flow from operating activity).

Table 3: Proposed Economic Footprint impact categories and company indicators

Impact Category	Life Cycle Phases							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Business Survivorship	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Green
Taxes	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow
Efficiency	Red	Red	Red	Yellow	Red	Yellow	Yellow	Yellow
Compliance	Yellow	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Employment	Yellow	Red	Green	Yellow	Yellow	Yellow	Yellow	Red
Inequality	Yellow	Red	Red	Red	Yellow	Red	Red	Red

- (1) Raw material acquisition
- (2) Bulk processing
- (3) Transportation
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- (5) Manufacture / Assembly
- (6) Transportation and distribution
- (7) Consumer use
- (8) Disposal/reuse

- Green means that 100% of the companies in the sample define at least one indicator linked with the impact category.
- Red means that none of the companies define an indicator linked with the impact category.
- Yellow means any other possibility (that at least one company, but could be more, define an indicator linked with the impact category).

With respect to “Compliance”, the indicators refer to economic cost of fines and penalties for example: “Fines or penalties due to data protection issues”, “Fines from Labour violations” and “Total

number of non-monetary sanctions for non-compliance with laws and regulations”. It is remarkable that companies do not report indicators regarding inequality about the income or benefit distributed along its supply chain. The only partially indicators that could be related to this impact category are those focused on the proportion of spending on local suppliers, although they do not represent clearly the scope of the inequality along the supply chain.

3.2.2 Best Practices and environmental, social and economic footprints

Tables 4, 5 and 6 show the level of disclosure of best practices used by companies to improve their sustainability performance. Note that those international standards and general practices that aim to enhance overall environmental, social or economic performance are beyond the scope of this section. These practices will be mentioned in the discussion section.

Regarding environmental footprint, companies allocate resources and efforts to fight against climate change and resource depletion (mineral and fossil, and water). In these categories, the best practices most remarkable in the reports are: Implementation of closed loop production system to recycle minerals, installation of new facilities to reduce emissions, green packaging to reduce the use of wood product, 3R initiatives for water resource management and the integration of energy performance indicators into the management of industrial performance. Other impact category taken into account in this sector regards “Human Toxicity” (Cancer effects and non-cancer effects). In this sense, a highlighted best practice is the use of control mechanisms to manage the materials’ effect on people’s health and on the environment.

Table 4: Environmental Footprint impact category and company best practices

Impact Category	Life Cycle Phases							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Climate Change	Yellow	Yellow	Green	Red	Yellow	Yellow	Yellow	Yellow
Ozone Depletion	Red	Yellow	Green	Red	Red	Red	Red	Red
Ecotoxicity – fresh water	Yellow	Yellow	Red	Red	Red	Red	Red	Red
Human Toxicity - cancer effects	Yellow	Yellow	Red	Red	Yellow	Red	Red	Red
Human Toxicity – non- cancer effects	Yellow	Yellow	Red	Red	Yellow	Red	Red	Red
Particulate Matter/ Respiratory Inorganics	Yellow	Yellow	Red	Red	Red	Red	Red	Red
Ionising Radiation – human health effects	Red	Yellow	Red	Red	Red	Red	Red	Red
Photochemical Ozone Formation	Red	Yellow	Green	Red	Red	Red	Red	Red
Acidification	Red	Yellow	Green	Red	Red	Red	Red	Red
Eutrophication – terrestrial	Red	Red	Red	Red	Red	Red	Red	Red
Eutrophication – aquatic	Yellow	Red	Red	Red	Red	Red	Red	Red
Resource Depletion – water	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Red
Resource Depletion – mineral, fossil	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Land Use	Yellow	Yellow	Red	Red	Red	Red	Red	Red

- (1) Raw material acquisition
- (2) Bulk processing
- (3) Transportation
- (4) Engineered / Specialty Material
- (5) Manufacture / Assembly
- (6) Transportation and distribution
- (7) Consumer use
- (8) Disposal/reuse

- Green means that 100% of the companies in the sample define at least one indicator linked with the impact category.
- Red means that none of the companies define an indicator linked with the impact category.
- Yellow means any other possibility (that at least one company, but could be more, define an indicator linked with the impact category).

Concerning social footprint, best practices mainly cover aspects related to employees, society and actors of the value chain. With respect to employees, initiatives are fundamentally based on health and safety topics like the adoption of workplace health and safety management systems and the implementation of mental health programs. Regarding society, the most developed best practices are both wide-range initiatives associated with “public commitments to sustainable issues” and specific practices to face critical challenges for the mobile phone industry with respect to “prevention and mitigation of armed conflicts”. In the case of the last subcategory, relevant examples are: the development of conflict minerals policy statement, the adoption of certifications linked to conflict free smelters and conflict-free sources integrated in circuit manufacturing. Likewise, in the value chain actors, the most frequent practices are based on the promotion of social responsibility along the supply chain such as “AngloGold Ashanti Human Rights Due Diligence (HRDD) Standard”, designed to consider human rights risks throughout the life cycle of company operations.

In addition, other common best practices are identified in the subcategory community engagement (Local community stakeholder). As an example of this subcategory, it is possible to highlight a practice connected with the implementation of recycling schemes which entails the redistribution of repaired devices to families in need through local authorities.

Table 5: Social Footprint sub-categories and company best practices

Stakeholder categories	Subcategories	Life Cycle Phases							
		(1)	(2)	(3)	(4)	(5)	(6)	(8)	
Workers/ employees	Freedom of association	Yellow	Red	Red	Red	Red	Yellow	Red	
	Child labour	Yellow	Red	Red	Red	Red	Yellow	Red	
	Fair salary	Red	Red	Red	Red	Red	Red	Red	
	Working hours	Red	Red	Green	Red	Red	Yellow	Red	
	Forced labour	Yellow	Red	Red	Red	Red	Yellow	Red	
	Equal opportunities/Discrimination	Yellow	Red	Red	Red	Yellow	Yellow	Red	
	Health and safety	Yellow	Yellow	Green	Red	Yellow	Yellow	Yellow	
	Social benefits/Social Security	Yellow	Red	Green	Red	Red	Yellow	Yellow	
Consumers	Health and safety	Red	Red	Red	Red	Red	Red	Red	
	Feedback mechanism	Red	Red	Red	Red	Red	Yellow	Red	
	Consumer privacy	Red	Red	Red	Red	Red	Yellow	Red	
	Transparency	Red	Red	Red	Yellow	Yellow	Yellow	Red	
	End of life responsibility	Red	Red	Red	Red	Yellow	Yellow	Red	
Local Community	Access to material resources	Red	Red	Red	Red	Red	Red	Red	
	Access to immaterial resources	Red	Red	Red	Red	Red	Red	Red	
	Delocalization and migration	Red	Red	Red	Red	Red	Red	Red	
	Cultural heritage	Red	Red	Red	Red	Red	Red	Red	
	Safe and healthy living conditions	Red	Red	Red	Red	Red	Red	Red	
	Respect on indigenous rights	Red	Red	Red	Red	Red	Red	Red	
	Community engagement	Yellow	Yellow	Red	Yellow	Red	Yellow	Yellow	
	Local employment	Yellow	Yellow	Red	Red	Red	Red	Red	
	Secure living conditions	Red	Red	Red	Red	Yellow	Red	Red	

Stakeholder categories	Subcategories	Life Cycle Phases							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Society	Public commitments to sustainable issues	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow
	Contribution to economic development	Yellow	Red	Red	Yellow	Red	Yellow	Yellow	Yellow
	Prevention and mitigation of armed conflicts	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Red
	Technology development	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow
	Corruption	Red	Red	Green	Red	Red	Red	Red	Red
Value chain actors (not including consumers)	Fair competition	Red	Red	Red	Red	Red	Red	Red	Red
	Promoting social responsibility	Yellow	Green	Green	Red	Yellow	Green	Red	Red
	Supplier relationship	Yellow	Yellow	Red	Red	Yellow	Red	Yellow	Yellow
	Respect of intellectual property rights	Red	Red	Red	Red	Red	Red	Red	Red

- (1) Raw material acquisition
- (2) Bulk processing
- (3) Transportation
- (4) Engineered / Specialty Material
- (5) Manufacture / Assembly
- (6) Transportation and distribution
- (7) Consumer use
- (8) Disposal/reuse

- Green means that 100% of the companies in the sample define at least one indicator linked with the subcategories.
- Red means that none of the companies define an indicator linked with the subcategories.
- Yellow means any other possibility (that at least one company, but could be more, define an indicator linked with the impact category).

In relation to the proposed economic footprint, best practices are mainly connected to “efficiency” category, for example resource efficiency and product energy actions and eco-design processes, and “compliance” category, such as the development of responsible business principles in matters of tax compliance and those associated with the following initiatives: Agreement on the prohibition of commercial bribery and LBMA (London Bullion Market Association) Responsible Gold Guidance Compliance Report.

Table 6: Proposed Economic Footprint impact categories and company best practices

Impact Category	Life Cycle Phases							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Business Survivorship	Red	Red	Red	Red	Red	Yellow	Yellow	Yellow
Taxes	Red	Red	Red	Red	Red	Yellow	Red	Red
Efficiency	Red	Red	Green	Yellow	Yellow	Red	Yellow	Yellow
Compliance	Yellow	Yellow	Red	Red	Red	Yellow	Red	Red
Employment	Red	Red	Red	Red	Red	Red	Red	Red
Inequality	Red	Red	Red	Red	Red	Red	Red	Red

- (1) Raw material acquisition
- (2) Bulk processing
- (3) Transportation
- (4) Engineered / Specialty Material
- (5) Manufacture / Assembly
- (6) Transportation and distribution
- (7) Consumer use
- (8) Disposal/reuse

- Green means that 100% of the companies in the sample define at least one indicator linked with the impact category.
- Red means that none of the companies define an indicator linked with the impact category.
- Yellow means any other possibility (that at least one company, but could be more, define an indicator linked with the impact category).

3.3. Discussion

After exploring the reported KPIs and Best Practices of a set of mobile phone companies and taking into account a product life cycle approach, the most visible finding is a lack of sustainability information generally accepted and applied by the sector in terms of indicators and best practices. It is important to note that only the green cells involve that 100% of the companies analysed partially or completely cover information related to the impact categories of the footprints. In this analysis, green colour is the less predominant which shows the necessity of a greater institutional effort in order to create a generally accepted framework to measure sustainability impacts and to

promote the implementation of effective standards, mechanisms and tools to manage environmental, social and economic risks in a comprehensive and coordinated way. This result has important implications for the sustainability since decelerate the contribution of companies to sustainable development. With respect to KPIs, the absence of specific and measurable indicators hinders to make informed choices knowing the real environmental, social, and economic impact. In relation to best practices, the lack of targeted management practices to improve sustainability performance limits the success of the practices already developed to fight against the global threats.

Another remarkable result is the disparity of information provided to the general public by the companies belonging to the different phases of mobile phone life cycle. This implies that decision makers could carry out a biased assessment based on the results of a company without considering the critical impacts generated in other life cycle phases. For instance, the transportation and distribution phase, the phase that is directly in contact with end consumers, does not reflect in the information provided the wide scope of the environmental impacts of the mobile phones. This phase is classified as a service activity, which generates few environmental impacts if those environmental impacts that go beyond the organizational boundaries are not considered.

Focusing on the analysis by dimensions, the environmental one is the dimension that presents a greater level of development. In this sense, the information frequently reported is related to climate change and resource efficiency (Resource Depletion-mineral, fossil) since they are widely addressed along the seven phases of the mobile phone life cycle. This finding could be explained by the large efforts, for several years, paid at different institutional level to fight against climate change (e.g. Goal 13 Climate Action – Sustainable Development Goals, Carbon Footprint) and foster Circular Economy (e.g. European Commission Policies, Chinese legislation or Ellen MacArthur Foundation).

Regarding social dimension, the limited level of development in the definition of indicators and best practices showed by the explored companies is not aligned with the large number of social concerns originated in the mobile phone sector. Despite being one of the sectors particularly critical in terms of social impacts, questions particularly relevant like child labour, fair salary, forced

labour, safe and safety of consumers and local community, secure living conditions of the local community or corruption, present an insufficient level of coverage. In this dimension, companies mainly prioritise employees in those aspects that involve a greatest institutional support and policy development like health and safety. However, even in this case, not all the companies of the sample have defined indicators and practices in order to manage this type of risk. It is particularly troubling in life cycle phases related to extraction of resources, engineered and specialty material, and manufacture and assembly.

Another remarkable finding is that in the case of the prevention and mitigation of armed conflicts, an issue especially sensitive for society, even there are advances in the definition of best practices; these are not indicators that measure their effectiveness and allow knowing and controlling the performance regarding this issue. This result supports calls for new assessment tools that guarantee the measurement and management of the critical aspects of the sector.

With respect to the economic dimension, the companies have adopted a limited approach, focusing essentially on those traditional profitability indicators from the annual financial statements or share performance ratios. These indicators are connected with a classical vision of the economic and financial management of companies, paying less attention to other aspects like taxes or distribution of income or benefits along supply chain.

Concerning indicators, it is observed a mix of types of indicators used to measure sustainability (e.g. results, process, impacts, and inputs). Most of the reported indicators do not measure directly an environmental, social or economic impact, since they are focused on measure a process or a step of a process, i.e. they are PIs. A possible explanation of these results is that a substantial number of companies publish indicators in a public sustainability reporting according to GRI guidelines, which are not closely aligned with the impact categories of footprints. This fact reveals the necessity of promoting reporting standards based on KPIs that support the information system of companies, which in turn helps stakeholders to make informed decisions.

With reference to best practices, a large number of the analysed companies have adopted certifications (e.g. B Corporation) and international standards generally accepted in environmental (ISO 14001), quality (ISO 9001) or health and safety (OHSAS 18001) aspects. In addition, a broad

range of companies have adopted sectorial standards like UL-110 Standard for Sustainability for Mobile Phones or IPC-1401 Corporate Social Responsibility and Sustainability Protocols for Electronic Manufacturing Industry. Nevertheless, in these cases, they mainly highlight the compliance with the standard requirements without explaining concrete best practices or KPIs associated with the standards. This finding implies a necessity to improve the standards in order to explicitly integrate them into the management system. Moreover, it is important to highlight best practices that, although they are adopted in an isolated way, they have a great potential for the future. These best practices are based on the use of big-data to optimize decisions, the implementation of appropriate technologies to move towards closed loop production processes, self-assessment platform, and eco-design processes.



4. Implementation of SMART Sustainability Assessment Tool (SAT) framework into the company

In this epigraph we are proposing the implementation of SMART Sustainability Assessment Tool (SAT) framework into the company, suggesting the way to select Key Performance Indicators (KPIs) and Process indicators (PIs) and how to prepare the documents to support the best practices manual.

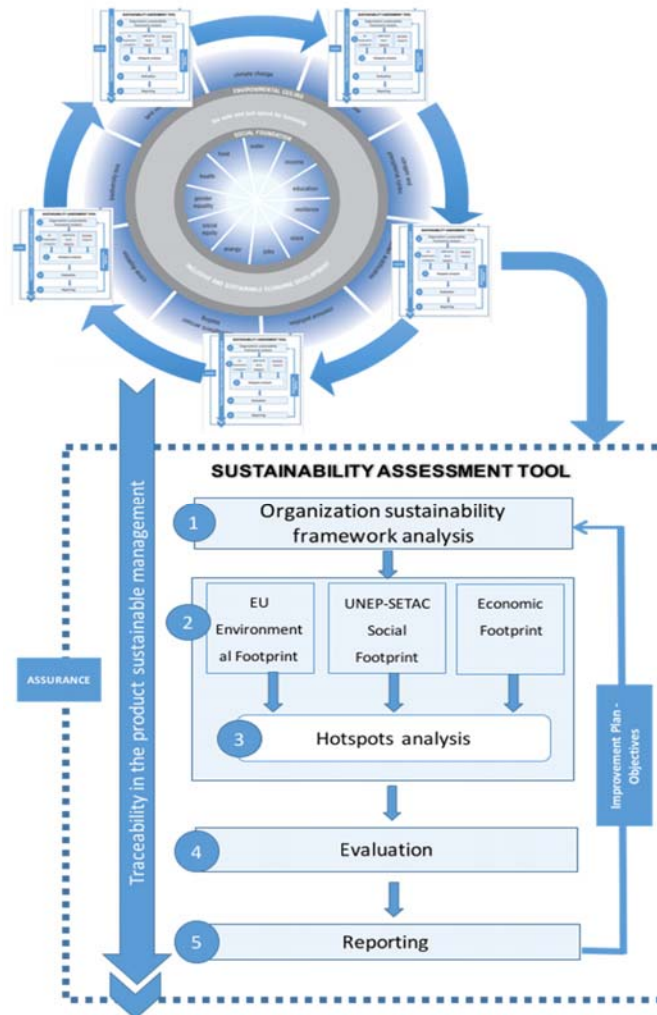
The first version of SAT, which was presented in D5.1 (Lifecycle Thinking: Issues to Be Considered) and in Muñoz et al. (2018), provides a manual of procedures for the assessment of the sustainable management of an organization under life cycle perspective, for annual periods, and analysing environmental, social, economic and good governance factors. Figure 3 shows the general outline of the SMART SAT.

A company in the framework of its supply chain management could implement the proposed corporate sustainability assessment tool. Concretely, a lead company can adopt SMART SAT to expand the sustainability principles to the rest of the actors of the supply chain. It should be consistent with the circular economy, sustainable development goals (SDGs), planetary boundaries, and social foundations requirements.

This SMART-SAT comprises five phases:

1. **Organization sustainability framework analysis**
2. **Footprints**
3. **Hotspots analysis**
4. **Evaluation: Sustainability Footprint**
5. **Reporting**

Figure 3: General outline of the SMART SAT (version 1.1.)



Source: Muñoz et al. (2018)

In addition, for the implementation of this sustainability assessment tool, it is necessary to consider two procedures: i) **Traceability in the products sustainable management** and ii) **assurance**. Finally, it is a necessary condition to **integrate sustainability into the governance model** as a way to manage and control the organisation, into the **functional structure** as a preventive discipline to

manage risk and into the **hierarchical structure** close to the top management team for a real comprehensive implementation (see Sjøfjell and Muñoz-Torres, 2018).

This framework and its phases have been explained with more detail in D5.1 (Lifecycle Thinking: Issues to Be Considered). In this context, this deliverable is focused on two important elements of the SMART-SAT: indicators and best practices. After the analysis of sustainability indicators and sustainable best practices of mobile phone companies, this section is focused on how mobile phone companies can define and implement KPIs, PIs and best practices to comply with the continuous improvement process in accordance with the SMART-SAT.

4.1. Key Performance Indicators (KPIs)

The definition of KPIs in the SMART-SAT framework is carried out by means of sustainability footprints, grounding on the best practices and aligned with key initiatives: Organizational Environmental Footprint from the European Commission and Social footprint from UNEP/SETAC S-LCA methodology.

The adoption of footprint methodologies implies the identification and measurement of environmental, social and economic impacts from a technical approach.

In this section, this deliverable presents the environmental and social footprint above-mentioned including the KPIs that could be directly applied in the SMART-SAT. In addition, considering the lack of a generally accepted economic footprint, this deliverable proposes the essential economic impact categories that should cover an economic footprint.

4.1.1. Environmental Footprint

From the environmental dimension, WP5 proposes the use of the Environmental Footprint of Organizations (OEF) as a basic analysis procedure 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 organisations”, especially in its annex III “Organization environmental footprint guide”

The main objectives of the OEF method are the determination of environmental 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 scientifically best established. Mid-points methods assess the impacts earlier in the cause–effects chain. Table 7 shows the default 14 environmental footprints impact categories for OEF studies.

Table 7: Environmental Footprint impact categories and indicators

Impact Category	Impact Category Indicator	Source
Climate Change	Tonne CO ₂ equivalent	Intergovernmental Panel on Climate Change, 2007
Ozone Depletion	kg CFC-11 equivalent (*)	WMO, 1999
Ecotoxicity – fresh water (1)	CTUe (Comparative Toxic Unit for ecosystems) (2)	Rosenbaum et al., 2008
Human Toxicity - cancer effects	CTUh (Comparative Toxic Unit for humans) (3)	Rosenbaum et al., 2008
Human Toxicity – non- cancer effects	CTUh (Comparative Toxic Unit for humans) (3)	Rosenbaum et al., 2008
Particulate Matter/ Respiratory Inorganics	kg PM _{2,5} equivalent (**)	Humbert, 2009
Ionising Radiation – human health effects	kg U 235 equivalent (to air)	Dreicer et al., 1995
Photochemical Ozone Formation	kg NMVOC equivalent (***)	Van Zelm et al., 2008 as applied in ReCiPe
Acidification	mol H ⁺ equivalent	Seppälä et al., 2006; Posch et al, 2008

Impact Category	Impact Category Indicator	Source
Eutrophication – terrestrial	mol N equivalent	Seppälä et al., 2006; Posch et al, 2008
Eutrophication – aquatic	fresh water: kg P equivalent marine: kg N equivalent	Struijs et al., 2009 as implemented in ReCiPe
Resource Depletion – water	m ³ water use related to local scarcity of water (4)	Frischknecht et al., 2008
Resource Depletion – mineral, fossil	kg Sb equivalent (****)	van Oers et al., 2002
Land Use	kg C (deficit)	Milà i Canals et al., 2007

Notes (European Union 2013: page 125)

Source: European Union (2013)

4.1.2. 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, the Social Life Cycle Assessment (S-LCA) method (UNEP-SETAC, 2009, 2013) 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 subcategories, and the characterization method and models; (ii) To relate the inventory data to particular subcategories and categories (classification); (iii) To determine and/or calculate the results for the subcategory 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 subcategory, 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. Table 8 shows the list of indicators at specific data provided in UNEP-SETAC (2013).

Table 8: 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 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 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
		Absence of working children under the legal age or 15 years old (14 years old for developing economies)
Workers/employees	Child labour	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

Stakeholder categories	Subcategories	Indicators
		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 vertime arrangements
		The organization provides flexibility
		Respect of contractual agreements concerning overtime
Workers/employees	Forced labour	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 safety reasons by the organization neither upon hiring nor during employment.
		Workers are free to terminate their employment within the prevailing limits
		Workers are not bonded by debts exceeding legal limits to the employer
Workers/employees	Equal opportunities/Discrimination	Total numbers 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

Stakeholder categories	Subcategories	Indicators
		Announcement of open positions happen 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 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 labour 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 (eg. 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

Stakeholder categories	Subcategories	Indicators
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 assessment
		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 for material resource conflict

Stakeholder categories	Subcategories	Indicators
		Does the organization have a certified environmental management system
Local Community	Access to immaterial resources	Annual arrests connected to protests of organization 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 organization
		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 Program to include Cultural Heritage Expression in Product Design/Production
		Is Relevant Organizational Information Available to Community Members in their Spoken Language(s)?
Local Community	Safe and healthy living conditions	Management oversight of structural integrity
		Management effort to minimize 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

Stakeholder categories	Subcategories	Indicators
		Number and quality of meetings with community stakeholders
		Strength of written policies on community engagement at organization 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 Global Reporting Initiative.
		Implementation/signing of Principles or other codes of conduct (Sullivan Principles, Caux Round Table, UN principles, etc.)
		The organization has pledged to comply with the Global Compact principles and has engaged itself to present yearly Communication On Progress
		Presence Mechanisms to follow-up the realisation of promises
		Presence of publicly available documents as promises 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

Stakeholder categories	Subcategories	Indicators
		Organization's role in the development of conflicts
		Disputed products
Society	Technology development	investments in technology development/ technology transfer
		Involvement in technology transfer program or projects
		Partnerships in research and development
Society	Corruption	Financial damages
		Formalised commitment of the organization to prevent corruption, referring to recognised standards.
		The organization carries out an anti-corruption program
		The organization installs or cooperates with internal and external controls 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 anticompetitive 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

Stakeholder categories	Subcategories	Indicators
		Integration of ethical, social, environmental and regarding gender equality criteria in purchasing policy, distribution policy and contract signatures
		Support to suppliers in terms of consciousness-raising and counselling concerning the 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 including consumers)	Respect of intellectual property rights	Organization's policy and practice
		Use of local intellectual property

Note: This table do 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)

4.1.3. Economic Footprint

Businesses and industries could quantify their economic footprint by measuring their direct, indirect, and induced economic contributions (upstream and downstream), at the international, national, state, county, and other levels: To extract technological and financial rents; to transfer funds around the world and shift accounting profits to low-tax jurisdictions and to consider the wage inequalities. Under these premises, WP5 proposes six economic impact categories detailed in Table 9.

Table 9: Economic Footprint impact categories and indicators

Impact Category
Business Survivorship (profitability, Net turn-over...)
Taxes (Cost to taxpayers or taxes not paid: effective tax rate/theoretic by country)
Efficiency (The gross value added rate, investment intensity in R&D)
Compliance (Value of compensations, fines and penalties, and taxes paid due to non-compliance)
Employment (direct and indirect)
Inequality: Income or benefit distribution along supply chain

Source: Own creation

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



4.2. Process Indicators (PIs)

KPIs are indicators whose definition should be stable over time and standardized within a sustainability framework in order to analyze its progress and to facilitate benchmarking among companies. However, a sustainability management system requires dynamic and adaptable tools in order to trace and control the organizational objectives for a considered period. This is the main reason for the definition of PIs. PIs are indirect quantitative measures of KPIs, focused on the measurements in a process or in a step of a process. They provide information for the control and monitoring of objectives related to KPIs and allows a continuous improvement process. Moreover, they can be used within the sustainability traceability of the product within the life cycle as “alarm indicators” in case of risk of transgressing the established limits of KPIs in any of the three categories and as bases for the definition of corrective measures.

Given that an effective PIs system should fit the organization's characteristics and needs, it is difficult to define a standardized set of PIs that companies of a specific sector can adopt. However, it is possible to identify the main features that should meet a suitable Process Indicator:

- Measurable. The comparison with a unit of measurement helps to ensure objectivity, consistency and accuracy of the indicator.
- Quantifiable. It shows the physical reality, specifies the results of the measurement and determines the level of achievement of objectives.
- Specific. It denotes the existence of a direct relationship between the indicator and the specific objective, which should be linked to KPIs.
- Temporary. The result of the indicator is associated with a defined period of time. Once the period has passed, the indicator must be updated to repeat the measurement according to stipulated unit of time.
- Relevant. It must address the necessary and sufficient information on the factors that can have an influence on the decision-making or action planning.

In order to help the design of an effective process indicator or to ensure that it meets the main features, the companies could use the following check questions:

- What do you want to measure with the PIs?
- Why do you want to measure it?
- Is it useful for monitoring the objectives?
- How often should company measure it?

4.3. Best practices

The SMART-SAT not only contemplates the sustainability indicators but also integrates in the culture of the organization a continuous improvement approach. Accordingly, the organization should foster the adoption of preventive policies and proactive practices and not only reactive ones in front of the nonconformities detected due to the evaluation process.

In this regard, a useful tool is the definition of best practices. They are understood as guidelines, rules, procedures, processes, actions, policies, programs, methods and innovative ideas that could implement a company to improve sustainability performance, which are integrated in the management system with the aim to be consistent with the continuous improvement process.

The definition of the best practices could be made explicit by means of a best practices handbook specifically developed by the organization. The good practices handbook is a channel for the top management to transmit how the organization could achieve the global sustainability targets to the rest of the organization. The best practices handbook should take into account the following considerations:

- All the members of the organization must know their role in the sustainability management, responsibilities, means to achieve the objectives and the importance of their individual effort.
- The best practices handbook must incorporate a consistent training strategy aligned with sustainability and life-cycle thinking.
- The best practices handbook should contribute to an effective assurance and information traceability process.
- This handbook could be the way to inform, share knowledge, and communicate actions under development between organizations belonging to the same the life cycle.
- The best practices handbook should include information related with the specific PIs, justification, description, expected results, responsible team, operational structure and tools, and protocol of revision and improvement.

A necessary condition for the implementation of this best practices handbook is the high-level commitment of the organization in order to ensure the consistency of the SMART-SAT implementation with the SMART Sustainable Governance Model.



5. Conclusions

This final section summarizes the main achievements of the Deliverable 5.3 and presents the connection with future developments of WP5.

5.1. Summary of achievements

The SMART Sustainability Assessment Tool (SAT) is designed for the assessment of the sustainability of the organizations and includes the appropriate tools to ensure the contribution to sustainability based life-cycle thinking. Deliverable 5.3 is focused on two basic elements, indicators and best practices, contextualized in mobile phone companies. The main purpose is twofold: i) to guide companies in how to define key indicators for the management of processes, for the performance measurement and for the information system in a sustainability context based on the four sustainability principles – a balance among its different economic, social and environmental dimensions, with an inter-generational perspective, an stakeholder approach and under life-cycle thinking and ii) to guide companies in how to use a set of best practices to comply with the continuous improvement process, both in accordance with the SMART-SAT.

The analyses of sustainability indicators and sustainable best practices of mobile phone companies carried out shows limited information associated with the environmental, social and economic dimensions. The aspects linked to climate change, resource depletion, health and safety and social security of employees are the most advanced in the management systems of the explored companies. This fact could be explained by the large efforts paid at different institutional level and policy development that these issues have received for several years.

From a life cycle perspective, a remarkable result is the disparity of information provided to the general public by the companies belonging to the different phases of mobile phone life cycle. This implies that decision makers could carried out a biased assessment based on the results of a company without considering the critical impacts generated in other life cycle phases.

To overcome this limitation SMART-SAT facilitates a comprehensive assessment structure comprised by KPIs and PIs and supported by the development of management best practices at

strategic and operational level. The definition of KPIs in the SMART-SAT framework based on sustainability footprints, grounding on the best practices and aligned with Organizational Environmental Footprint from the European Commission and Social footprint from UNEP/SETAC S-LCA methodology. PIs are indirect quantitative measures of KPIs, focused on the measurements in a process or in a step of a process, which should fit organization's characteristics and needs. For this reason, it is difficult to define a standardized set of PIs that companies can adopt. However it is possible to identify the main features that PIs should comply with in order to be effective. In addition, the SMART-SAT attempts to foster proactive organization committed with a continuous improvement approach for sustainability. In this regard, a useful tool is the development and implementation of best practices, explicitly defined and consistently integrated in the management system of the organization. To do that, a necessary condition is the high-level commitment of the organization as the SMART Sustainable Governance Model proposes.

5.2. Relation to forthcoming work in SMART

The main results of this deliverable have been shared with D5.2 and both deliverables will contribute to the development of the following outcomes:

- D5.4. Report SMART – SAT Guidelines
- D5.5 (Proposal of Multi-Criteria Decision-making methodology to assess supply chain management)
- D5.6 (Results of the testing process in the selected case studies)
- Design of economic footprint

6. References

- 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 (Accessed on 28/05/2018)
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- UNEP-SETAC (2009). Guidelines for Social Life Cycle Assessment of Products. Available at: <https://www.lifecycleinitiative.org/starting-life-cycle-thinking/life-cycle-approaches/social-lca/> (Accessed on 28/05/2018)

Annex: List of analysed companies that belong to mobile phone life cycle.

- AngloGold Ashanti Ltd
- Apple Inc
- Covanta Holding Corp
- Covestro AG
- CSX Corp
- Dixons Carphone PLC
- Eramet SA
- Fairphone
- Huawei Technologies
- Imperial Holdings Ltd
- Minsur SA
- Mitsui Kinzoku
- Nippon Yusen KK
- Orange SA
- Pennon Group PLC
- Ricoh Co Ltd
- Samsung Electronics Co Ltd
- Samsung SDI Co Ltd
- Seche Environnement SA
- Simplo Technology Co Ltd
- Solvay SA
- Sumitomo Metal Mining Co Ltd
- Telefonica SA
- Texas Instruments Inc
- Umicore SA
- Vodafone Group PLC
- Waste Management Inc

The company data analysed in this deliverable were obtained from public information about sustainability performance and practices of the companies selected (Sustainability reports, Integrated reports, Websites, etc.). The data was collected considering available information during April, May and June 2018.