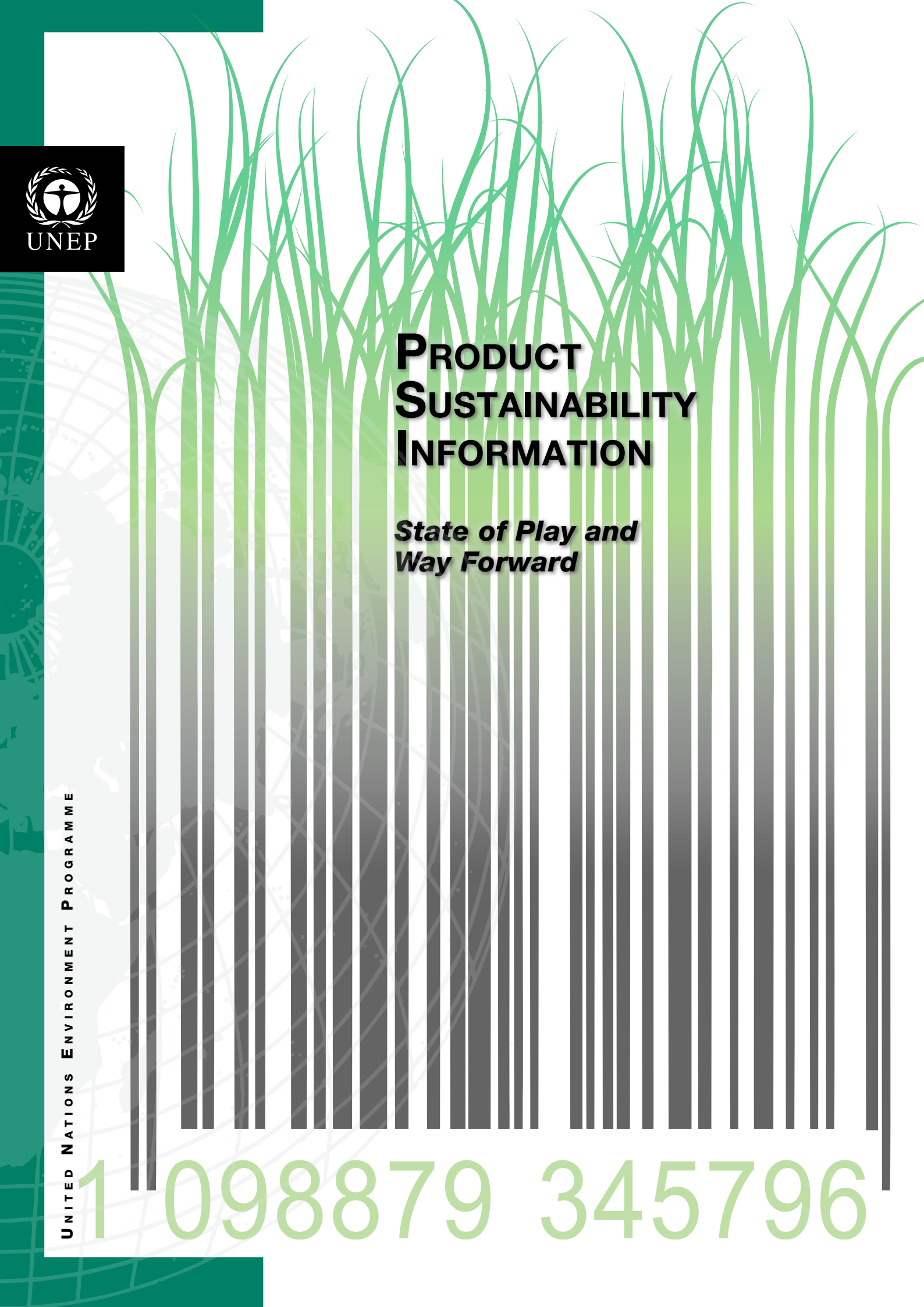

Product Sustainability Information

State of Play and Way Forward

United Nations Environment Programme

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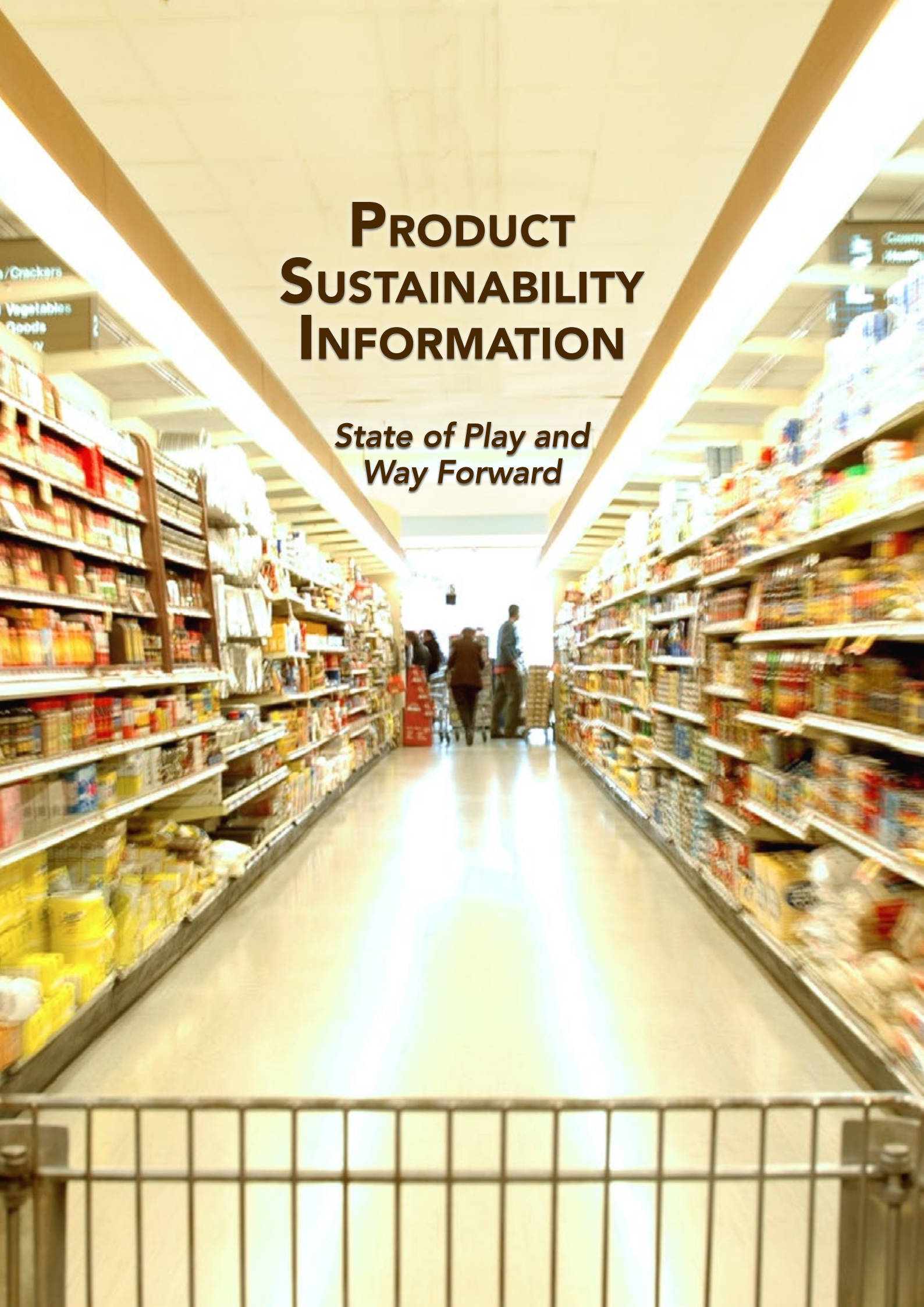

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State of Play and Way Forward

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TERMINOLOGY

Acronym	Expansion
APEC	Asia-Pacific Economic Cooperation
B2B	Business-to-business
BIER	Beverage Industry Environmental Roundtable
C2C	Cradle-to-cradle
CD	Committee draft
DIS	Draft international standard
EPA	United States Environmental Protection Agency
EPD	Environmental product declaration
FSC	Forest Stewardship Council
GEDNET	Global Environmental Declarations Network
GEN	Global Ecolabelling Network
GHG	Greenhouse gas
GPP	Green Public Procurement
ISEAL	International Social and Environmental Accreditation and Labelling Alliance
ISO	International Organization for Standardization
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
LCT	Life Cycle Thinking
NGO	Non-governmental organisation
OEF	Organisation Environmental Footprint
PAS	Publicly Available Standard
PCR	Product Category Rule
PEF	Product Environmental Footprint
PSI	Product Sustainability Information
PVC	Polyvinyl chloride
QR Code	Quick Response Code
RFID	Radio-frequency identification
SCP	Sustainable Consumption and Production
SETAC	Society of Environmental Toxicology and Chemistry
SME	Small and medium enterprises
SPP	Sustainable Public Procurement
UNEP	United Nations Environment Programme
UPC	Universal Product Code
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

EXECUTIVE SUMMARY

Unsustainable patterns of consumption and production threaten global development and environmental well-being. Ensuring sustainable consumption and production should take a life cycle approach, and central to this is the development of product sustainability information (PSI).

An overview of the current state of PSI begins with an acknowledgement of the complexities in assessing the sustainability aspects of a product. Given this reality, the need to determine the social, health and environmental impact of the millions of different products demonstrates that the ambitions of any sustainability metric or tool are high. The only way to deal with this complexity is to simplify reality into an appropriate model—but one that reduces complexity, while minimising distortion and uncertainty. In the late 1980s, this insight resulted in the development of an approach, known as Life Cycle Assessment (LCA). Yet, the ambiguity and uncertainty of LCA results and the difficulty of communicating them in a meaningful way have led to a flurry of tools and approaches either to simplify or to standardise the assessment.

Complicating the process are various stakeholders in the field of product sustainability that have unique, and sometimes overlapping vested interests. They can have differing influences with varying levels of intensity on the process of creating and communicating information.

The drivers of and barriers to PSI are varied. On the demand side, there is a growing interest in buying products that are considerate of the environment and/or social concerns. Consequently, an increasing number of countries, local authorities, businesses and organisations are gradually embarking on sustainable procurement and translating their purchasing power into active sustainability policies. Yet, with the plethora of PSI tools, consumers can become confused and move from an attitude of interest to one of scepticism and even outright cynicism or mistrust. The over-abundance of labels and standards in this field is further exacerbated by the launch of new tools, methodologies and standards that do not have sufficient support for their efforts to address the existing problems of quality, accuracy and consistency.

On the supply side, the drivers for the development and use of tools and initiatives for the sustainability of products vary temporally and geographically based on social and institutional structures, cultural and traditional influences, access to technology, and other factors. These drivers are: business decisions, technology enablers, market pull and policy push.

The growing complexity and inter-relationship between the drivers of tools and initiatives has led to the creation of a wide variety of tools that provide information on the sustainability of products to consumers. At least 600 tools are estimated to be on the market. However, the number of tools is not an indication of importance. The best way to interpret a high number of tools in a certain area is that the landscape is fragmented, not mature, and that there is no consensus on what the tool should do.

The landscape of tools and initiatives reveals some important implications and gaps in the current state of PSI. Some of the tools are not available in all countries, while accessibility of quality information is a prerequisite. Moreover, most tools provide information on the sustainability attributes of products, as opposed to actually rating the product's sustainability. Thus, a majority of the tools do not provide value judgments on the sustainability attributes, but rather leave it to the users to draw their own conclusions. With this in mind, rethinking the PSI in terms of its accessibility is essential.

In light of the lack of a common PSI standard, efforts should be made to have an inclusive dialogue among nations that enjoys equal representation from developing and emerging economies so that they can ensure consensus and inter-operability. Since there are too many tools, which are not always co-ordinated and aligned, this creates confusion and inefficiency. To counter this, the procedures and inter-operability of systems should be aligned. This would allow for different and competing tools, thereby making room for innovation and increased effectiveness.

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Because PSI labels generally address only the key impact or life cycle stage of a product and do not always take a life cycle perspective, they can be misleading and create confusion and doubt in consumers. An agreed vision is needed to understand what consumer information needs to be within a given context. This perspective may result in more success stories.

This publication provides the following four recommendations to advance in this direction:

- Provide a global guidance for inter-operability of PSI tools (their development and use), and manage concerns over trade barriers while reducing uncertainty in the information that the tools produce. This can be done under the umbrella of the Consumer Information Programme under the 10 Year Framework of Programmes.
- Encourage major PSI actors, i.e. label and tools associations to use life cycle-based principles as criteria for the alignment of their work.
- Facilitate the inclusion and engagement of representatives of developing and emerging economies in international efforts on PSI.
- Create an international dialogue between brand owners, retailers, consumer organisations and policy-makers in order to acknowledge the different cultures and contexts to develop a better understanding of what consumers will recognise to be information that is credible and that they can act upon.

1. INTRODUCTION

The increasing level of interest in sustainable consumption between 1970 and now can be visualised in four waves (Elkington and Müller, 2002) after awareness of the issue was created by, for example, the Limits to Growth report in 1972 (Meadows et al., 1972). The 1980s saw the first wave, with conversations around consumption and recycling, and the emergence of voluntary labelling systems (Big Room and WRI, 2011). The 1990s introduced the emergence of the Lifestyles of Health and Sustainability (LOHAS)[1] market segment and Fair Trade labelling[2]. The third wave occurred in 2007-2008, partly due to increased climate change advocacy and the combined effect of the Internet, and related focus on product quality and energy efficiency, which resulted in the proliferation of ecolabels and claims. The fourth wave is now emerging, with sustainability becoming mainstream and business looking for improvement opportunities and retailers influencing consumers and supply chains, while the widespread use of smart phones allows greater access to information.

Today, many of the world's most pressing development challenges and environmental crises can be traced to patterns of consumption and production that are not sustainable. Consequently, limiting environmental and social degradation during economic growth is essential to dealing with the challenge of providing a dignified quality of life for Earth's population without exhausting its resources (UNEP 2011; Fischer-Kowalski et al., 2011).

The framework of Sustainable Consumption and Production (SCP) has guided national and international sustainable development policy development and action since the term "sustainable consumption" was articulated in 1994 at the Oslo Symposium. It is defined as "[the] use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations."

As a holistic concept, SCP is grounded on a life cycle-based perspective that considers the total use of resources and the emissions, effluents and waste resulting from that resource use. It also seeks to promote a better quality of life, alleviate poverty and de-couple economic growth from environmental degradation (UNEP, 2011).

Applying the concept of SCP to economic activities requires identifying what defines sustainable products and services, how they are produced and consumed sustainably, and by what means they can be identified and selected by consumers. Products form the bridge between production and consumption, connecting consumers to complex supply chains that have spread increasingly worldwide. A life cycle approach to SCP is the basis for an objective and verifiable environmental claim (Fischer-Kowalski et al., 2011).

At the 2012 UN Conference on Sustainable Development in Rio de Janeiro (RIO+20)[3], the heads of state adopted the "10 Year Framework of Programmes (10YFP)" to enhance co-operation around SCP. One of the initial programmes identified in the 10YFP is "Consumer Information" (UN, 2012), which seeks to facilitate the easy, practical and sustainable choices by consumers through the provision of accessible, reliable and verifiable sustainability information by market suppliers. The latter will aim to ensure that information about product sustainability is backed by credible science, communicated in a consistent manner and easily understood by all users.

The United Nations has been aware of those challenges and has been actively involved in the area of PSI, for example, through its

1 http://www.lohas.com/

2 http://www.fairtrade.net/

3 http://www.uncsd2012.org/

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joint initiative between the United Nations Environment Programme (UNEP) and the Society of Environmental Toxicology and Chemistry (SETAC) on the Life Cycle Initiative. One strategic project that emerged from this effort is Global Principles and Practices for Hotspot Analysis, whose objective is to provide global guidance on PSI.

This report analyses information and communication about PSI. It provides an overview of the current state in the area of PSI, analyses the key trends, drivers and challenges in this field, and draws policy recommendations on how to facilitate better decision-making on the sustainability aspects of products.

1.1 Objectives and scope

The focus of this report is on PSI. It is timely to assess the landscape of PSI tools and initiatives, and to analyse strategically where there is a need to focus through improved and reliable information in order to make better decisions, leading to more SCP. Product information is associated with helping consumers make more sustainable choices, usually through a business-to-consumer communication context. This implies the involvement of key stakeholders that produce the information as well as those who interpret and facilitate such communication to consumers. The report also considers various co-ordinating initiatives that aim to align and harmonise the tools.

Although the term "tool" can be used in many ways, in this report we focus on those that perform one or more of the following functions: gather, process, assess, interpret and communicate data and other information on the sustainability of products. We also include tools such as policy guidelines, guides and codes because they perform some or all of the above functions. This information can help users of information understand how their choices and behaviour have an impact on sustainability. Aside from quantitative tools, the processing of qualitative information and even procedures to convey information to a target audience is considered a tool. As will be seen in this report, the tools are only one part of the puzzle; the stakeholders and initiatives, which operate or make use of them, are just as important.

This report investigates the four main aspects that determine the way in which information about sustainability is generated and how consumers and other stakeholders are informed:

- The fundamental challenges around understanding and communicating sustainability information of products and the current landscape of sustainable product information tools.
- The main stakeholder groups and potential "game changers" or innovations on the horizon.
- The mechanisms, incentives and drivers that create this landscape.
- Analysis of the tools and initiatives landscape in developed and developing countries.

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The target audience is providers and mediators of that information, such as the governmental and non-governmental organisation (NGO) community as well as public and private entities currently working in this area.

The term "sustainability" is used widely in this report. In principle, it should refer to its three pillars—people, planet and profit—but the tools often only address the planet or ecological aspect, and sometimes only one feature, such as climate. For readability, as well as to promote the potential importance of considering all three pillars, we always refer to sustainability as comprising them.

1.2 Methodology

The analysis focused on gathering information from various sources in order to be as comprehensive as possible. The desktop research was performed to gather data about activities in this field and to bring its various influences into perspective. The literature review encompassed peer-reviewed journal articles, reports, white papers, news articles, on-line forums, conference proceedings and websites. The tools and initiatives were identified and categorised based on different parameters.

An international survey, including interviews focusing on regional and selected country perspectives, was conducted in early 2013 to supplement the analysis. Representatives from the participating organisations are listed in Appendix II.

2. THE COMPLEXITIES OF PRODUCT SUSTAINABILITY INFORMATION

2.1 The science behind product sustainability information

The sustainability attributes of a product are often invisible. If this report is printed, the reader would not see any environmental impact while reading it. Only upon reflecting on the life cycle of the report would she or he realise that the authors used computers, the Internet and electricity, that paper was needed, that a printer used ink and energy, and that there are impacts from recycling the report. Given this, the need to determine the impact of the millions of different products demonstrates that the ambitions of any sustainability metric or tool are high. Namely, we try to define a way to understand the emissions and resource use, and sometimes the social impacts along the life cycle of everything we make and do; and we try to understand the impact on everything we care about: for example, the impact on our health and ecosystems, and the availability of resources for future generations. This means that we are dealing with a complex problem. How do we objectively understand each and every supply, use and end-of-life chain? How do we understand the environmental mechanisms that can explain how an emission impacts on the things about which we care?

The only way to deal with this complexity is to simplify it into an appropriate model, which may potentially distort the measurement of the reality. Therefore, the key challenge is to find an effective way to reduce complexity, while minimising distortion and uncertainty. In the late 1980s, this insight resulted in the development of an approach, known as Life Cycle Assessment (LCA) inspired by earlier studies in the late 1960s described as Resource and Environmental Profile Analyses (REPA). As we shall see, the concept of LCA is at the basis of all information, which comes from the assessment of the sustainability aspects of products. We shall also see that the ambiguity and uncertainty of LCA results and the difficulty of communicating them in a meaningful way have led to a flurry of tools and approaches either to simplify or to standardise the assessment.

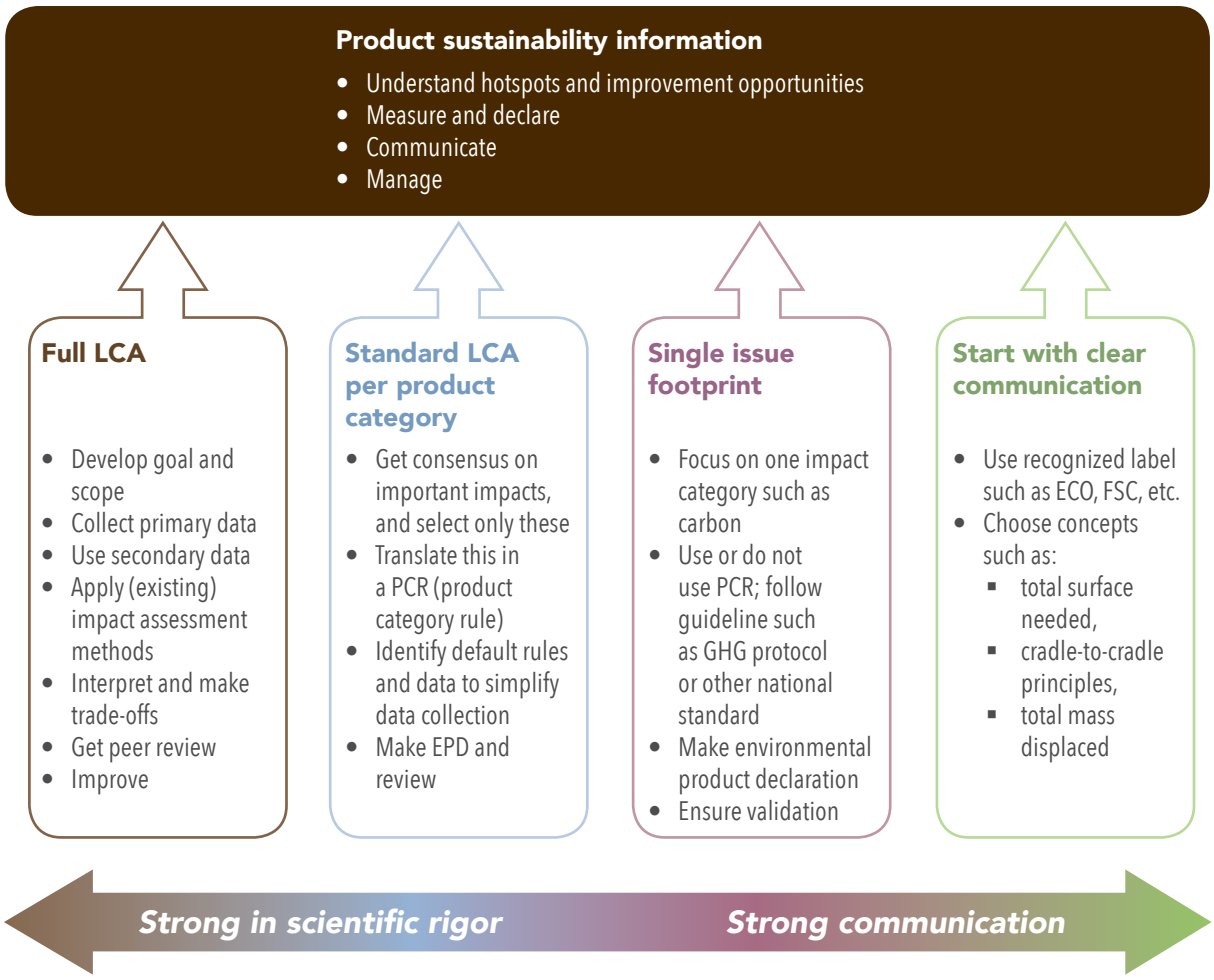
Without recommending any approach, Figure 1 (next page) describes the most common routes used to determine and communicate the sustainability of products.

(1) Performing a full LCA. This approach requires the standardisation of data and impact assessment methods. The results of LCA studies can then be communicated through Environmental Product Declarations (EPD) or more simplified models such as life cycle-based ecolabels. The key consideration and challenges with this approach include:

a. *Data and databases:* To date, large databases represent industry's average data for certain activities, such as producing steel, transporting a kilogram of a material or product, producing heat and electricity, landfills and incinerating or recycling materials. The publication Global Guidance Principles for Life Cycle Assessment Databases[4] has made a very important contribution to consensus building on how to collect data and manage databases in a consistent way. However, most of these databases use secondary data, which do not distinguish between individual companies. Therefore, additional efforts and funds are required for each company to collect specific primary data. Collection is generally time intensive. Moreover, companies are worried that such data may reveal confidential information, which can cause reluctance to provide them.

4 http://www.lifecycleinitiative.org/wp-content/uploads/2012/12/2011%20-%20Global%20Guidance%20Principles.pdf

Figure 1: Various routes currently used to determine and communicate PSI, as they appear to have developed in practice since the 1990s.



b. *Environmental impact assessment methods:* As many commodities are traded on the world market, it is difficult to assess the precise impacts of these products along their life cycle. Since 1990, several research groups (Ahbe et al., 1990; Steen, 1999) have developed default Life Cycle Impact Assessment methods, which have standardised—albeit not very precisely—and created a way of translating emissions into impacts. In recent years, significant improvements in the assessment methodologies have been made in an effort mostly co-ordinated by the UNEP/SETAC initiative (de Haes, 2002; UNEP, 2003; Jolliet et al., 2004; Rosenbaum et al., 2008). The EU Joint Research Centre has also made an important input in the determination of effective practice in impact assessment, which has resulted in the adoption of 14 default impact categories for the EU footprinting initiative (Product Environmental Footprint (PEF)/Organisational Environmental Footprint (OEF); European Commission, 2013a; European Commission, 2013b).

c. *Social and economic assessment methods:* The standardisation of measurement and assessment is still in its infancy. The Guidelines for a Social LCA (UNEP/SETAC Life Cycle Initiative) has been the first serious attempt to develop such a

framework (UNEP and SETAC, 2009). Economic aspects can be also assessed along the life cycle through tools like Life Cycle Costing (LCC) , which is becoming a common practice in LCA in business and large-scale investment projects.

d. *Communication of life cycle-based information:* It is difficult to convert a full LCA study and communicate the results in a format easily understandable by non-experts. However, ISO Type I ecolabels and EPD are, as mentioned, two such options for summarising key findings. Still, most commonly-used communication channels only address one life cycle impact category: for example, carbon or water (as explained below).

(2) Using guidance and standardisation per product category. If, within a product group, consensus can be reached about the most relevant impacts and the best way to collect and use data, it is possible to simplify the LCA process by using Product Category Rules (PCR), which were developed based on the results and experience of previous full LCAs. As explained later, this is very important to communicate to consumers.

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(3) Limiting the scope of assessment and communication to a single impact category of a life cycle. At the expense of getting a comprehensive overview, assessing one or several impact categories simplifies both the data collection and the impact assessment. For example, carbon or water footprinting methodologies are the most commonly-used assessments. However, the risk is that important impacts are missed. We have seen this in the discussions around biofuels, where the policy initially focused heavily on carbon, while important issues around land use had been overlooked (ANEC, 2012; UNEP, 2009).

(4) Starting with a compelling communication concept. Approaches mentioned under points 1a and 1b prioritise scientific rigour over the ability to communicate. Therefore, the challenge is how to communicate meaningful information that is scientifically robust and contributes to sustainability improvement, and that is easily understood by consumers to inspire them to change their consumption patterns. This has led several groups to focus on communicating a message that is easy to understand and will encourage people to act, but which sometimes sacrifices scientific rigour or broadness of scope. Examples include:

a. Third party-certified information on a single life cycle stage of concern, such as Forest Stewardship Council (FSC), fair trade organic, etc. There are hundreds of schemes, but the more robust ones have aligned themselves under the International Social and Environmental Accreditation and Labelling Alliance (ISEAL).[5]

b. Some privately owned and operated frameworks such as Cradle to Cradle (C2C)[6] use a life cycle-based concept that relies on a vision that all loops in resource use will be closed. The concept has value, as it inspires

5 ISEAL is a membership organisation that brings together some of the most important certification programmes like Rainforest Alliance, MSC, KRAV, Fair Trade, etc., www.iseal.org

6 Developed in Europe by EPEA in Hamburg http://epea-hamburg.org in the USA by the C2C institute. Originally developed for buildings, but now also used for products.

companies to act and to label products. It deviates somewhat from the scientific consensus on issues such as the recognition of CO_2 emission as a problem. In the C2C concept, CO_2 is seen as a nutrient and, thus, not a problem.[7]

c. Although footprinting has become a general term, "ecological footprint" originally meant calculating the total surface area of the Earth needed to produce commodities and absorb emissions. This results in an easy-to-interpret message. For example, at current consumption levels, we would need the resources of three times our Earth (Wackernagel, 1991). This type of information inspires and motivates people; however, it raises questions about scientific rigour, as the method is not always applicable to the life cycle.

2.2 The credibility issue and the role of ISO standardisation

Soon after the first LCA studies were published in the early 1990s, various stakeholders called upon the International Organization for Standardisation (ISO) to develop standards. Interestingly, the initiative came from a number of large companies due to the concern that inconsistent LCAs could potentially result in false claims by competitors or unjustified criticism by NGOs. The technical Committee TC207 dealing with environmental management established Sub-committee SC5 on LCA with the mandate to develop the ISO 14040 (1998), 41, 42 and 43 standards, to be replaced in 2006 by the new 14040 and 14044 standards. They set important procedural requirements on how to conduct an LCA and how to review LCA studies. The standards do not describe the verification of data; consequently, there is no formal procedure to verify the validity of the data and methods. The review process only focuses on the consistency of the methods. (In Annex 1, a number of references to these standards are given.)

Soon after, development of the 14020 series of standards on communication and claims began:

- ISO 14020 defines the general principles for environmental labelling. For example, Principle 5 states that LCA results should address all relevant impact categories, without creating the impression that less important impact categories are relevant. This is often referred to as the "materiality" of the communication. Later, when the carbon and water footprint standards came into development, this principle created a problem, as one may not a priori decide which impact category is implemented (see the discussion of the 14067 Technical Specification below).
- ISO 14021 describes the process of making claims. For example, "this product contains X% recycled material." The key message is that the claims must be relevant and verifiable, and it must be a differentiator among other products. For example, claims like "this toothpaste does not harm the ozone layer" are not in line with the standard, as no toothpaste has impacted the ozone layer.
- ISO 14024 describes the ecolabel Type I standard. Well-known examples include Blue Angel of Germany, EU Ecolabel or Nordic swan. Many developing countries such Brazil, China, or Thailand also have their own Type I labels. It is a yes/no label, awarded by an independent verification body. The label is developed based on a screening LCA to identify which product features or characteristics have a major influence on environmental performance and to set criteria for product compliance. This means that LCA plays a role in the process of finding the hotspots in the product group. Products that comply with these criteria are awarded. A full LCA by producers is not required.

7 For an in-depth discussion on C2C and LCA, consult provided references and the following report: http://www.agentschapnl.nl/sites/default/files/bijlagen/Position_paper_Usability_of_LCA_for_C2C_purposes-.pdf

- ISO 14025 describes the procedures for a Type III environmental label. This is the label type that provides quantitative information on a number of relevant impact categories. The standard also defines the concept of the PCR and the role of a programme operator as a responsible entity for managing the process. The goal of the product categories is to prescribe in detail how the LCA should be conducted for a product group. PCRs are developed by programme operators through a public stakeholder consensus process. This standard plays a key role in the product category approach described above, as this is a basis for informing consumers and businesses with quantitative data. However, many programme operators currently create duplicate or overlapping product category rules.

Around 2008, carbon footprinting became an important topic and the UK PAS2050 was proposed as the basis for a carbon footprint standard under ISO. However, Principle 5 of the ISO 14020 series of standard does not allow a priori to select a single issue, like carbon, for a Type III declaration. This implies that, in principle, the ISO 14025 standard on environmental product declaration cannot be used for single-issue footprints. For this reason, the 14067 standard on product carbon footprinting has become complex. The ISO 14067 standard was rejected twice, reportedly due to resistance mainly from developing countries that view this standard as a potential trade barrier. In April 2013, this standard became ISO Technical Specification 14067 on Carbon Footprint of Products (ISO/TS 14067, 2013).

With the support of the majority of ISO members including developing countries' support the water footprint standard (ISO 14046 2014) did not have the same fate and was approved in July 2014.

Next to these ISO standards, an increasing number of life cycle-based standards measure and improve the environmental and social performance of products. Examples of product standards include BP X30-323 in France; Greenhouse Gas (GHG) Protocol Product Standard by the World Business Council for Sustainable Development (WBCSD) and the World Resource Institute (WRI); PAS 2050 CFP in the United Kingdom; the EU Product Environmental Footprint (PEF); and the Japanese and Thai carbon footprint standards. Examples of organisational footprint standards include the GHG Protocol Corporate and Corporate Value Chain (Scope 3) Standard, and the EU Organisational Environmental Footprint (OEF). These standards often differ in geographical scope and methodology, as well as in sustainability attributes.

In addition, governments and NGOs are active in ensuring the credibility of information through various approaches, ranging from UN and government-led guidelines on environmental claims to non-governmental organization campaigns, such as the USA Federal Trade Commission Green Guides for the Use of Environmental Marketing Claims, or the 7 Sins of Greenwashing campaign in Canada.[8]

8 http://sinsofgreenwashing.com/about-us/

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3. STAKEHOLDERS

3.1 Short description of the major stakeholder groups

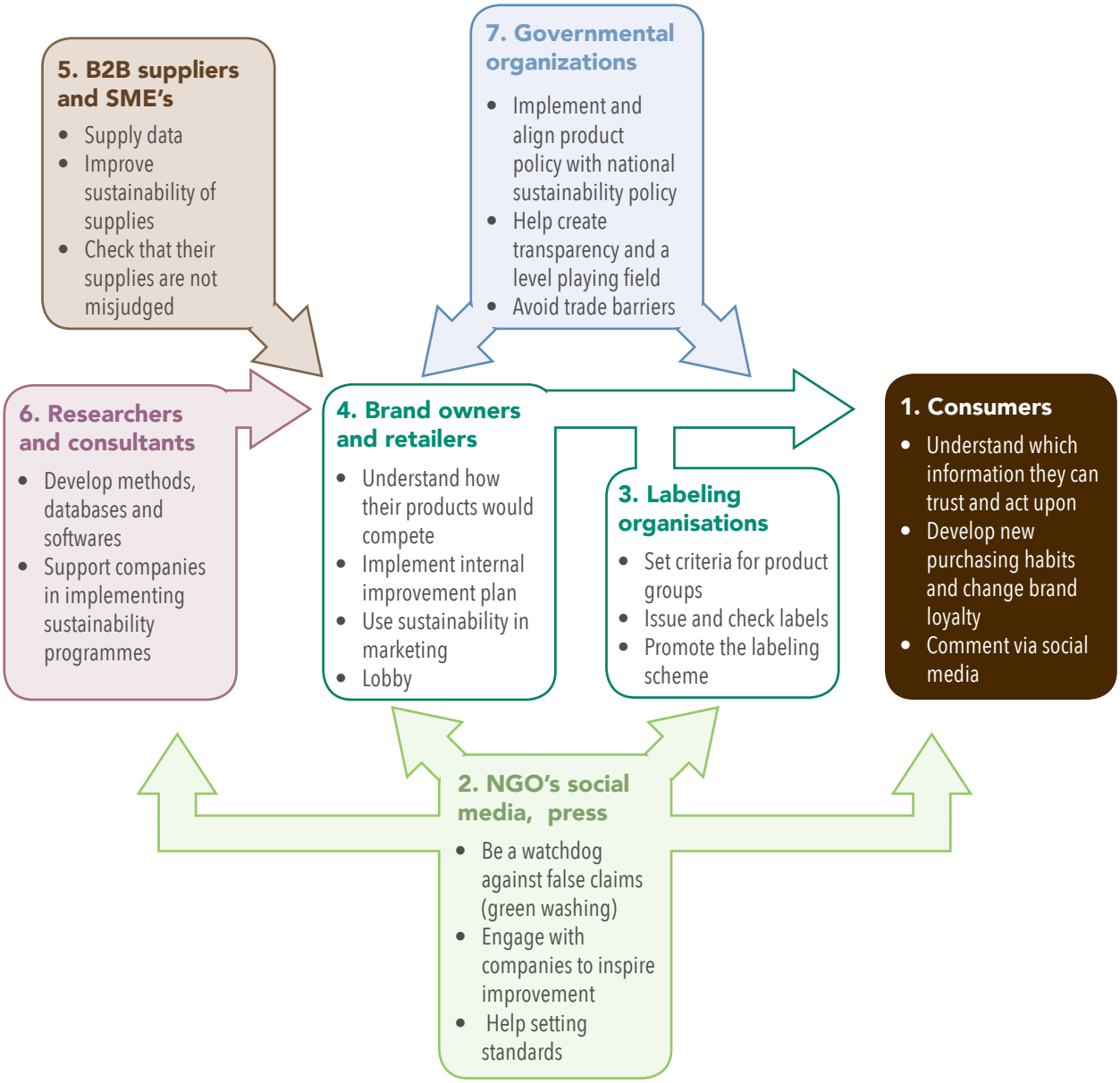
Various stakeholders[9] in the field of product sustainability have unique, and sometimes overlapping, vested interests. They can have differing influences with varying levels of intensity on the process of creating and communicating information. Therefore, there is no single way to categorise and identify these stakeholders. Figure 2 represents a simplified map of key stakeholders with their corresponding roles and functions in this area.

9 A stakeholder is an individual or organisation who has the ability to affect or will be affected by a given issue or initiative (Freeman, 1984).

(1) Consumers and the organisations representing them

Consumers are at the receiving end of PSI. With the advent of social media, consumers who are supposed to receive, understand and act upon sustainability information have also become communicators of such information, which has become an important concern and driver for companies.

Figure 2: Simplified stakeholder map and their main roles.



Consumer interests are represented by organisations such as Consumers International and its extensive member network, although not all are active in the sustainability area. Consumers International has participated in discussions related to the ISO carbon footprint standard. Based on its survey and research, it argues strongly that putting a quantitative label on a product does not inform, but rather confuses or even misleads, the consumer.[10] It claims that the only fair communication is to present a product in a ranking with other ones, much like the energy efficiency labels that indicate where a product falls, ranging from class A to F (Consumers International, 2012). Therefore, it is not clear if consumers will welcome the way that quantitative footprinting labels are currently designed.

(2) NGOs

NGOs and other civil society organisations want to influence producers, consumers, government in order to place sustainability issues on the agenda and avoid false claims and greenwashing. Although many NGOs are also the initiators and operators of labelling schemes (presented below as a separate category), many non-labelling organisations are also trying to influence consumers to buy or boycott a product. Often they do this not because they want to inform, but to put pressure on a brand owner to change or withdraw the product. This pressure is especially applied in European and North American markets, and less so in developing countries. This may also explain the lack or limited incentive to adopt a sustainable consumption strategy in these regions, as we discuss below.

10 There are several reports with similar conclusions, but a good example is http://www.anec.eu/attachments/ANEC-R&T-2010-ENV-001final.pdf

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(3) Labelling organisations and initiatives

The labelling organisations represent a rather diverse group, including many stakeholders mentioned in Figure 2, and their common purpose is to try to improve the way brand owners communicate sustainability impacts through providing an independent assurance process. The improvement implies communication of relevant sustainability aspects and the non-use of misleading information. These organisations are engaged in issuing a variety of labels. However, the main ones are those following the ISO classification of environmental labelling as described in section 2.2. These environmental labelling organisations try to bring more objective and credible information to the consumer, either with a yes/no label (Type I) or a quantitative (Type III) label:

- The Global Ecolabelling Network (GEN) is a membership organisation of Type I life cycle-based labelling initiatives including the EU flower, the Nordic swan, the Brazil Hummingbird and others—altogether 27 members operating in over 50 countries. GEN aims to co-ordinate and facilitate co-operation and mutual recognition between their member programmes. This type of labelling is especially popular in Europe, although the programmers are always successful partly due to the policy of retailers

(as we shall see in section 3.1.4). Initially, these organisations were developed by governments, but they are becoming increasingly self-financed, as label holders have to pay a small percentage of the turnover that is generated by labelled products.

- ISEAL is a membership organisation of certification schemes, such as the FSC or Rainforest Alliance. They generally do not include quantitative information and they apply a similar yes/no approach to that of GEN members. However, they are not fully based on a life cycle approach and do not explicitly apply ISO 14024. Instead, they are based on 14021 for Type II claims. The verification is usually done on-site at the production stage with which the label is dealing.
- The Global Environmental Declarations Network (GEDnet) is a membership organisation of Type III ecolabelling programmes. The standard sets a number of detailed requirements for a programme operator and how to run the labelling scheme. According to ISO 14025, any organisation complying with these rules can be called a "programme operator." In Asia and Europe, programme operators are often either run or strongly influenced by governments. In the US, a number of sometimes competing organisations have evolved as programme operators, leading to a very fragmented landscape.

(4) Industry-led organisations of brand owners and retailers and individual company initiatives

Brand owners and retailers are the contact point between the supply and the demand for products. They play a key role in this field, as they ultimately decide what or what not to communicate to consumers and how this is done. This communication is usually seen as part of the overall marketing of a product. They can also drive the need for PSI through their supply chains, engaging business-to–business (B2B) suppliers.

In recent years, retailers have become more active in the product sustainability area. In the past, they were (and often are still) not very happy with labelling schemes, worried that they would confuse customers, or make them suspect that there was something wrong with non-labelled products. A common attitude among brand owners is to create confidence in their consumers that products on their shelves have been selected based on sustainability aspects and thus removing any concerns about consumers' shopping experience. For instance, AHOLD, an international supermarket, developed its own "Pure and Honest" logo that is based on its own internally-developed criteria. Next to this, it accepts products that have the Fair Trade, Marine Stewardship Council and EKO label[11], which are too well known to exclude. According to the author, such retailers therefore see themselves as a filter for labels by deciding what type of information a consumer receives. They sometimes require other brand owners not to use other labels on their products.

Wal-Mart, which established The Sustainability Consortium (TSC), had a similar intention. TSC is interested in understanding sustainability impacts of products (hotspots) and tries to encourage suppliers to address improvement opportunities. These efforts are not focused on labelling, but rather on creating the message that what is on the Wal-Mart shelves is good for the consumer or, at least, that action is being taken to make those products better. Recently Wal-Mart started to identify the best rated products in 100 product categories as "produced by a sustainability leader" in the shop.

A somewhat different strategy was applied by the supermarket Tesco, which was a driving force behind the PAS2050-based carbon

11 An organic label in the Netherlands

labelling efforts. It developed many activities, but in 2012 the decision was made to stop putting quantitative information about carbon on products, as the programme was becoming too costly and perhaps not effective. In France, Casino, among others, developed a carbon labelling strategy; however, instead of printing the labels on products, it specified the carbon footprint on the cash register slip. Later, they replaced it with an environmental index that integrates criteria for GHG emissions, water consumption and water pollution along the life cycle of products[12].

Probably the oldest retailer initiative came from the Swiss Migros, and then followed by the Swiss Coop. Even before 1990, this was a strong driver for the development of the first LCA database, known as the BUWAL database for LCA purposes, which initially focused on packaging materials and then became the basis for the well-known Ecoinvent database. Migros was also a driver behind the development of the Swiss "ecopoints" impact assessment method, which aggregates all impacts into a single score. Even though Migros and Coop helped to develop this method, which would allow a single score label, they mainly use LCA for driving improvements and recognising hotspots without the ambition to label products.

In a parallel internal UNEP study on retailers, we investigated the initiatives in more depth, focusing on those in developing countries. We found very few initiatives in these countries that were life cycle or specifically product based, although a number of general sustainability projects among these retailers is on the rise.

Next to retailers, there is a very large group of brand owners, such as car companies, electronic and apparel manufacturers, and service providers such as phone companies, drinks, etc. The Consumers Goods Forum is an important organisation that tries to develop consensus among various sustainability efforts by large market players. It has, for instance, developed the sustainable packaging guideline and toolkit.

In recent years, other examples of organised industry activities have been steadily emerging. For example, the Sustainable Apparel Coalition is a large consortium that represents about one third of the entire apparel industry. It has agreed to share both ideas and information that would allow each member to improve environmental performance and to label products. It developed the Higg index, which works according to Type III labelling, but can also be Key Performance Indicator (KPI) based. The Beverage Industry Environmental Roundtable (BIER) coalition, a group of 5,600 brands producing more than 300 billion hectolitres of drink, wants to achieve similar goals as the Sustainable Apparel Coalition.

(5) Industry-led initiatives by non-brand owners (B2B suppliers)

B2B companies play a somewhat different role from information providers, since they try to communicate sustainability information to the brand owners and retailers, and ensure compliance by their product designers and suppliers with sustainability aspects. This group includes a very large number of small and medium enterprises (SMEs) that do not market their own brands to consumers.

Their role is especially relevant when data need to be collected. In the B2B context, many activities on the communication of sustainability aspects are also undertaken with the purpose of positioning themselves as suppliers of sustainable products. As per the author, over the years, many B2B companies have started to collaborate in such joint initiatives. The first significant one came from the Association of Plastics Manufacturers in Europe, out of concern that the European debate on polyvinyl chloride (PVC) would

12 http://www.groupe-casino.fr/fr/nos-engagements/encourager-une-consommation-respectueuse-de-lenvironnement/

impact on human health and the environment, creating a negative image for plastics in general. It produced LCA studies on different types of plastics and promoted best practices. Almost all commodity sectors have followed this lead.

Unlike the brand owners, their aim is not to inform consumers, but to guard the credibility and sustainability of the raw materials and supplies they make. Data that they produce are limited from C2C, as they often do not know, or have no influence on, how their materials are used. In general, their sustainability information is more detailed than what would be understood by consumers. An interesting example is the chemical company BASF's approach that creates calculation tools and web pages for its client groups.[13] For instance, if BASF has developed a new chemical for the fish farming industry, it develops targeted information and tools for that sector to show sustainability improvements of this new chemical. Another objective of this group is to inform and influence tool and database providers so that the data they provide are correctly used to produce objective results.

13 http://www.basf.com/group/corporate/en/sustainability/eco-efficiency-analysis/index

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(6) Tool developers: researchers, consultants and others

Researchers and consultants develop tools, approaches, methods and datasets. Consultants also often engage with companies to help them assess their own position in the field of sustainability and to identify improvement opportunities. In most cases, companies are analysing and improving their own performance long before they start communicating it.

For better clarity, the group can be separated into the following sub-groups. However, the borders are often blurred:

- Academic researchers develop new methodologies, especially in the field of impact assessment. It should be noted that the most widely-used methods have in fact been co-ordinated and developed by consultants and inter-governmental agencies.
- Consultants usually help companies understand the sustainability of their product groups and co-develop methods and tools to integrate sustainability in their decision-making processes.
- Consultants, NGOs or governments develop PSI tools.
- Database providers develop and maintain databases, whose number is still small.

(7) Governmental organisations

Governments have various roles, and the intensity of their engagement varies. Most governments, especially those in developed and in a growing number of emerging economy countries, support at least some LCA and ecolabelling initiatives because they want to help create a level playing field and facilitate the production and provision of credible objective information. They also are looking for ways to align product policy

with overall sustainability and other national objectives. The examples of these policies are the incentives and legislation around fuel-efficient cars and lighting, and the chemical content of products. As in the case of biofuels, policies are often product oriented; however, they serve the strategic goal of becoming less dependent on energy imports. Another known concern, especially in developing countries, is the fear of trade barriers. Governmental organisations try to facilitate a level playing field and protect national interests. Their role is also important in creating demand for more sustainability information through a sustainable public procurement (SPP) process.

Below we discuss some relevant examples of national and inter-governmental organisations' efforts in the area of PSI and the LCA data required to support PSI (Sonnemann and Valdivia, 2013):

- Japan's Ministry of Economy, Trade, and Industry and the Japan Environmental Management Association for Industry are very active in developing national LCA databases, tools and methods, which are provided at a low price to users. The government also actively promotes carbon footprinting both in Japan and abroad through international technical assistance to the governments in the Asia-Pacific Economic Cooperation (APEC) region.
- Brazil, Thailand and Malaysia actively support the development of national databases for LCA.
- South Korea has been managing an active Type I ecolabel programme, as have Japan, China, Thailand and Taiwan, which are integrated with Green Public Procurement policies.
- In China, government-sponsored projects have supported the collection of national LCA data at a large scale (e.g. the Chinese Life Cycle Database (CLCD) 2014), although most data have not yet been shared between different providers.
- India has had a few LCA conferences, but has not yet initiated developing a national database. In 1991, it launched a Type I ecolabel, which has been largely unsuccessful and is currently inactive.
- EU activities are prominent on following fronts:
  - A number of the member states have longstanding Type I and Type III ecolabelling programmes. In addition, Europe has the most widely-known Type I regional ecolabelling programmes, such as the EU Ecolabel and Nordic swan, also used in green public procurement efforts.
  - An LCA centre—the Joint Research Centre (JRC) in Ispra, Italy—has developed methodologies, best practice documents and an LCA database. It also created the International Life Cycle Database network (ILCD) and made collaboration agreements with countries such as Malaysia, Thailand, Brazil and France.
  - The Directorate General for the Environment has launched a Product Environmental Footprint (PEF) and an Organisational Footprint (OEF) pilot project. The methodology is LCA based, and will have a broad scope, covering up to 14 impact categories. Participation is voluntarily, and open to industry groups that represent at least 51% of the EU market. The interest has been high; around 120 pilots were proposed, but due to budget constraints, only 27 could start. Eight of these cover food, the others cover a wide range of topics, both consumer facing and B2B oriented. Some pilots contain industries from China, Japan or the US. There was less interest in the OEF, but it is worth noting that some retailers are in an OEF pilot. The PEF/OEF pilot aims to assess the potential of developing an average

environmental profile for a reference product, and how this can be used in communication (which is left to the participants in pilot projects). The major difference with other labelling schemes is that products are compared to a benchmark, enabling consumers to see directly if the product scores better or worse than the average product in the product category. This explains the requirement that pilots must represent more than 50% of the market; Industry itself is responsible for determining the benchmark, using the strictly defined LCA methodology. Emphasis is also put on how the information can be verified (which, as mentioned in section 2.1, goes much further than the review process used in LCA).[14]

  - France completed a similar experimentation process for environmental footprinting labelling, resulting in policy recommendations currently under review.
  - DG Enterprise completed a feasibility study for extension of the Ecodesign directive for energy-related products to all non-energy related product categories, contemplating the possibility of making it a minimum environmental standard for all products in the EU.[15]

- The Swiss government is actively supporting developing countries in the creation of databases. The most well-known database, Ecoinvent, originated in Switzerland with initial support by the government, although it has not directly funded the database's development.
- Mexico has developed its own national database though this is still not publicly available.
- The US government has a facilitating role, as there are already many market-driven initiatives and activities. The US Environmental Protection Agency (EPA) has developed several product ecolabelling programmes and database tools such as the Design for Environment (DfE) programme and the EcoTox Database. The EPA also encourages the use of LCA through regulation and guidelines, for example, the Pollution Prevention Act (Greening the Economy through life cycle thinking). In addition, the US government has developed guidelines for the use of environmental claims for marketing products.

It is interesting to note that primarily private initiatives originally developed LCA databases in Europe with little government support. As a result, those databases and software providers lead the market. However, more databases are being developed around the world and, as seen by the examples of Japan, Thailand, South Korea, Mexico and Brazil, with strong government support. Although private initiatives are important for future development of the LCA databases and the related information about product sustainability, the support of the government and international organisations has helped to strengthen database initiatives, as in the above-mentioned cases, through various regulatory and voluntary measures. An analysis of how high-quality LCA data could be produced would help to steer future investments.

A Global Network of Interoperable LCA Databases, coordinated by UNEP, has been launched to improve the international collaboration in the area of LCA databases. During the 4th meeting in Malaysia in April 2015, an ambition was formulated that aims to connect all major databases by 2017.

14 http://ec.europa.eu/environment/eussd/smgp/product_footprint.htm

15 http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/review/files/ecodesign_evaluation_report_executive_summary_en.pdf

4. THE *DRIVERS OF* AND *BARRIERS TO* SUSTAINABILITY INFORMATION

4.1 The perceived demand side of the tool landscape

Insights into consumer and organisation purchasing behaviour indicate a growing interest in buying products that are considerate of the environment and/or social concerns (National Geographic and GlobeScan, 2012; Deloitte and GMA, 2009). At the level of large-scale institutional purchasers, an increasing number of countries, local authorities, businesses and organisations are gradually embarking on sustainable procurement and translating their purchasing power into active sustainability policies. In 2010, Brazil enacted a federal law to make the promotion of SPP by all public entities mandatory (UNEP, 2013a), while Malaysia has set a target of 50% of select product and services procured by government agencies to be greener by the year 2020 (UNEP, 2013a). Having tools (discussed in the next chapter) that manage information on the sustainability of products can benefit not only producers, but also users of information who can determine how their choices affect sustainability.

Consumer perceptions and attitudes on broader aspects of sustainable consumption were found to vary greatly around the world. The Greendex 2014 survey indicates that consumers in emerging economies continue to dominate in their performance in the sustainable consumption rankings, while their counterparts in developed economies perform poorly. Consumers in developing and emerging countries tend to be more concerned about sustainable consumption (The Nielsen Company, 2014). In China, India, Brazil, and Argentina consumers tend to be most concerned about environmental issues and feel guilty about their impact on the environment. Thus, preferably purchasing environmentally sound products remains most common in developing countries, particularly in Brazil. Compared to the Greendex 2012, environmentally friendly behaviour among consumers in 9 of 18 countries surveyed has increased, while it has decreased in 5 countries. Preferences toward used or pre-owned goods have increased in the majority of the countries surveyed. The majority of consumers in 17 out of 18 countries surveyed indicate that they prefer to repair goods that are broken, as opposed to replacing them. While consumers in most countries prefer reusable rather than disposable goods, they are less likely to prefer to buy used products over new products. American and French consumers are most likely to buy used products, while Russian consumers are less likely to do so (Greendex, 2014). The attributes of sustainably conscious consumers are, in order, found to be responsible, caring, smart and healthy (National Geographic and GlobeScan 2014, Nielsen 2014).

While some consumers are cognisant of sustainability considerations, not all consumers who intend to purchase sustainable products actually do so.[16] Studies indicate that consumer purchasing behaviour is still principally dictated by price, quality and convenience rather than by product origin and sustainability content (Deloitte and GMA, 2009; WEF, 2010).

In addition, given the plethora of PSI tools, consumers can become confused and move from an attitude of interest to one of scepticism and even outright cynicism or mistrust (WEF 2009, Consumers International 2009). For example, an Ipsos Reid report (2007) found that consumers in the US and Canada appear to be wary of companies that label their products as being "green" or environmentally friendly;

16 This gap is described as the "Ethical Purchasing Gap" (Nicholls and Lee 2006) or the "Attitude Behaviour Gap" (Kim et al. 1997; Boulstridge, E. and M. Carrigan 2000). See also The McKinsey Quarterly: March (2008)

and that 70% of American respondents called the green designation "just a marketing tactic." In parts of Europe, the outlook is somewhat more positive, but consumers seem to be looking to governments to intervene in the form of mandatory labelling or standard-setting. A Eurobarometer poll of more than 20,000 interviewees conducted in 2007 found that 72% of citizens favour mandatory product carbon labelling (EC, 2007).

For the purpose of this study, field research in ten different developing countries was conducted to gain an additional perspective on these issues, the results of which echoed general scepticism among consumers. For example, Brazilians found that unverified claims often confuse them and affect their purchasing choices. Consumers in India and Turkey often correlate environmentally-responsible products with low performance and/or high price, which is not necessarily the case.[17] The survey also identified the cost, a lack of environmentally-friendly options and information as barriers to more sustainable consumption practices.

While the Ecolabel Index[18] and SELECT Ecolabel Manager[19] aim to reduce the disorder in the realm of ecolabels, they are not without their limitations. According to a recent report, one third of the 150 labellers surveyed did not attempt to evaluate or monitor the environmental and social benefits of their ecolabels (Golden, 2010). The over-abundance of labels and standards in this field is further exacerbated by the launch of new tools, methodologies and standards that do not have sufficient support for their efforts to address the existing problems of quality, accuracy and consistency.

17 Author's own research.

18 http://www.ecolabelindex.com/

19 http://www.selectecolabels.com/

4.2 Supply side drivers

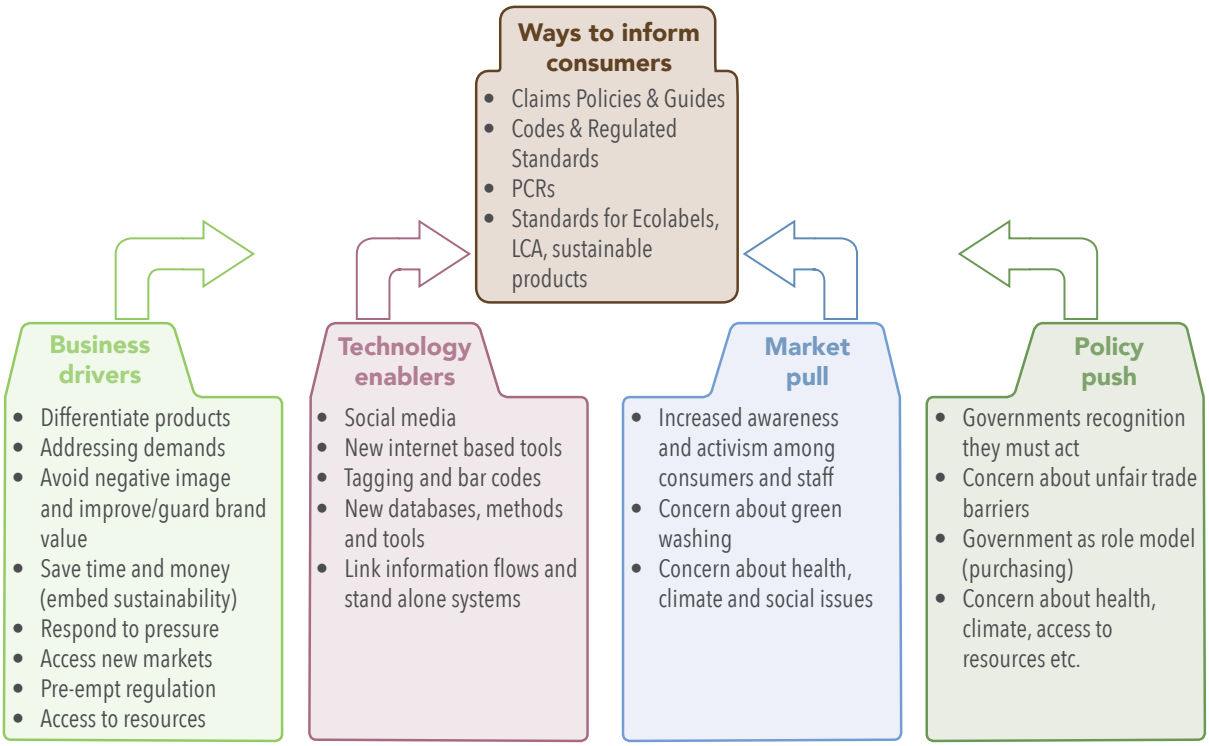
The drivers for the development and use of tools and initiatives for the sustainability of products vary temporally and geographically based on social and institutional structures, cultural and traditional influences, access to technology, and other factors. These drivers, highlighted in Figure 3 (p. 24), are grouped into four categories: business decisions, technology enablers, market pull and policy push.

Business Decisions: Ninety-three per cent of CEOs (from a sample of 1000) from around the world view sustainability as a crucial part of their company's future success (UN Global Compact and Accenture, 2013). Business decisions are predominantly linked to increasing profits and shareholder value over time, and most often have strategic and/or economic rationales. An example of the latter is the concern around the access to supply of resources. For instance, cocoa processing companies are competing with each other in programmes that are aimed at making the supply chain more sustainable and reliable. They work closely with certification schemes such as Fair Trade and Rainforest Alliance toward this objective.

Technology Enablers: The rapid development of technology and social media has allowed the creation of tools that are capable of doing things that were hardly imaginable two decades ago. Technology has not only helped to further improve our knowledge of the environment, but also advance our modelling and communicating. Technology enablers are linked to the ability to obtain, process and communicate increasing quantities of complex information.

Market Pull: As discussed in section 6.1 (below), perceiving growing public awareness of sustainability issues—especially as they relate to products—large brand owner companies launched their own green

Figure 3: Drivers for the development and use of tools and initiatives for the sustainability of products



products, such as the Toyota Prius hybrid[20] vehicle (named the Number 1 Best Global Green Brand by InterBrand agency in 2011), or by acquiring well-known sustainable brands, such as Unilever's purchase of Ben and Jerry's and L'Oreal's purchase of the Body Shop.[21] According to Nielsen's 2014 Global Survey on Corporate Social Responsibility, demand for greener products increased significantly over the past years especially in developing and emerging countries (The Nielsen Company, 2014).

In turn, retailers and brand owners impose sustainability and information requirements on the suppliers, pushing the demand further upstream of the supply chains. This is the result of SPP, which serves as a driver for this kind of information. For example, the uptake of Thailand's carbon footprinting can be, in part, based in the perceived growing demands from international retailers and buyers for such information.

Policy Push: In addition to role of the market pull through SPP, governments play an important push role. The policy and regulatory process both structures and guides the institutional environment in which PSI is created and used. Such drivers include national, state or local policies to encourage green consumption, regulations to protect the environment and worker rights, creation of voluntary standards systems for various aspects of sustainability, budgetary incentives to advance sustainability action, environmentally-preferable procurement policies, and co-ordinated actions across governmental agencies.

At the international level, as seen in discussions on ISO described in section 2.1, governments can also strongly influence the processes for certain tools in view of their trade implications.

20 Best Global Green Brands 2011; Available from: http://www.interbrand.com/en/best-global-brands/Best-Global-Green-Brands/2011-Report/Toyota-Riki-Inuzuka.aspx

21 Ethical Consumer; Available from: http://www.ethicalconsumer.org/commentanalysis/factsvgreenwash/ethicalcompanytakeovers.aspx

5. THE LANDSCAPE OF TOOLS AND INITIATIVES

5.1 Framework for categorising the sustainability of information tools

The growing complexity and inter-relationship between the drivers for tools and initiatives has led to the creation of a wide variety of tools that provide information on the sustainability of products.

The focus is on tools that can support the creation of information to a user. As shown in Figure 4, a user of this information may be a consumer, a professional purchaser in the public and private sector, a regulator, a policy-maker, an NGO advocating on a certain issue or a company. Each user will have a different reason to utilise the tool and may have different requirements for the types of information presented.

Sometimes a tool is provided by producers themselves or by external parties. Some tools are geared toward regulating and structuring the market for claims, such as setting standards, regulatory codes or guidance on how to make sustainable product marketing claims. Most tools are entirely voluntary.

In this section, tools and initiatives were categorised using a number of parameters. To create these parameters, we posed a series of simple questions a person might ask when considering sustainability information and then linked the appropriate categories and sub-categories in order to answer those questions.

Table 1 (p. 26) gives the key questions and parameters identified. Detailed sub-categories exist under each of these categories and are

Figure 4: Categories of tools

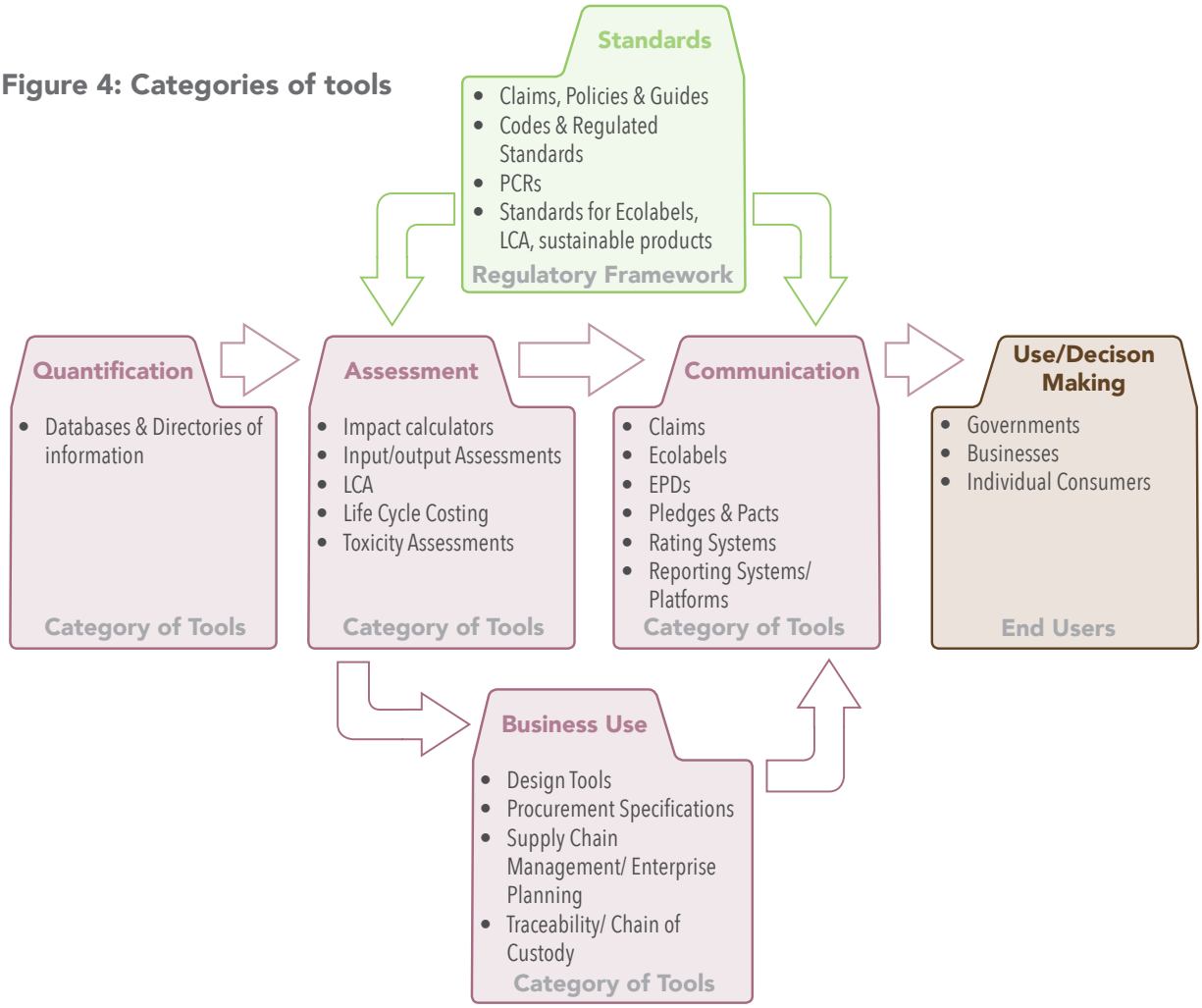


Table 1: Questions and corresponding categories

Question		Parameters
What is the tool used for?	▶	Type of Tool
	▶	Function of Tool
Who creates and uses the tool?	▶	Target Audience
	▶	Organisation Type
Where can you find it?	▶	Regional Presence
	▶	On / Off Product
What topics does the tool cover?	▶	Industry Sector
	▶	Value Chain / Life Cycle
	▶	Certain sustainability Issues
How does the tool actually work? What methodology is it based on?	▶	Methodology
How is the tool provided to users?	▶	Business Model
	▶	Voluntary / Mandatory
When is the tool available?	▶	Status

presented in Appendix I. Such an approach should enable stakeholders to catalogue the current landscape empirically, including the breadth, depth and scope of existing tools.

5.2 Review of tools and initiatives

Table 2 provides a list of tools that were catalogued based on the above parameters, with descriptions of their specific function. Given the sheer number of various ecolabels, they are all categorised into one group, independent of their type. Ecolabels are, in essence, based on the information processing capabilities of supporting tools. Although there was a clear focus in Chapter 1 on the importance of the life cycle approach in assessing the sustainability of products, here the LCA is mentioned as one of the tools.

In this study, 206 tools were reviewed and compiled, along with 24 co-ordinating initiatives. If you add to that the 459 ecolabels being tracked by the Ecolabel Index[22] and over 170 standards tracked by the ITC Standards Map,[23] over 600 tools are estimated to be on the market. Additional tools and initiatives may not have been identified in this study; rather, this analysis is intended only to give an overview of the landscape.

The number of tools is not an indication of importance. The best way to interpret a high number of tools in a certain area is that the landscape is fragmented, not mature, and that there is no consensus on what the tool should do. A clear example is the area of LCA tools providers (software and databases). Although several dozen providers existed in the 1990s, a market "shake-out" has resulted in just a few remaining players and alliances.

In considering the primary target audience of the catalogued tools, it was found that 81% of them were developed for professionals, while only 12% were developed solely for consumers. This shows that the demand and potential willingness to pay for tools and information is higher for professional purposes. The type of tools designed for consumers indicates that they prefer to receive sustainability information in a manner that can be readily used. On the other hand, the large number of professional tools indicates that the market is still in its infancy and that a large

22 http://www.ecolabelindex.com/

23 http://www.standardsmap.org/

Table 2: Landscape of sustainability information tools covered in this study

Types of Tools	Category*	Function of the Tools	Examples
Claims policies and guides	1	Regulate sustainability-related marketing claims	US FTC Green guide, 7 Sins of Greenwashing
Codes & regulated standards	1	Regulate production practices	ISO standards, EU REACH
Product Category Rules	1	Set rules for how the sustainability of products should be assessed	
Standards for ecolabels, standard setting & LCAs	1	Set common rules to ensure credibility	ISO 14020 series
Standards for sustainable products	1	Provide a set of criteria that determine the sustainability of products	EU Eco-design Directive
Databases	2	Collect and provide data	Eco-invent (Switzerland), ILDB (EC)
Impact Calculators	3	Calculate impacts of products, including footprints, carbon, etc.	AMEE, Earthster, Paper Calculator
Input/Output Assessments	3	Calculate impacts of products	Economy Map, Open-IO
Life Cycle Assessment	3	Calculate impacts of products	
Life Cycle Costing	3	Calculate cost of a product over its full life cycle	
Toxicity Assessments	3	Determine and rate the toxicity of materials or products	EcoTox
Claims and self declaration	4	Provide information on the sustainability of products and services based on self-declarations	Content label claims
Ecolabels - verified claims	4	Indicate more sustainable products & services to consumers based on third party verification and qualitative information	EU Eco-label, Humming Bird Brazil
Environmental Product Declarations	4	Report quantitatively on the sustainability aspects of products and services in a standardised format	Environmental EPD System, Eco-Leaf Japan

continues on next page...

* Refers to Categories in Figure 4 (p. 25).

Table 2 continued

Types of Tools	Category*	Function of the Tools	Examples
Pledges & Pacts	4	Ensure common assessment or reporting frameworks through public statements and commitments formulated by a group and a sector	Global Social Compliance Programme
Footprinting tools	3 and 4	One single issue LC-based calculation and communication	Water Footprint (ISO 14046) and Carbon Footprint ISO 14067
Rating Systems	4	Rate products on sustainability aspects	Good Guide, Top 10
Reporting Systems/ information platforms	4	Guide users on sustainable information tools or products	ITC Standards Map, Ekobai, Good Guide
Design Tools	5	Design more sustainable products	AutoDesk Sustainable Design for Manufacturing, TESPI
Procurement Specifications	5	Give guidance from buyers to suppliers on sustainability of products	
Supply chain metrics	5	Help producers manage the sustainability of supply chains	Walmart Sustainability Index
Traceability/Chain of Custody	5	Determine and trace the origin of particular products in a supply chain	HarvestMark, String, Sourcemap

* Refers to Categories in Figure 4 (p. 25).

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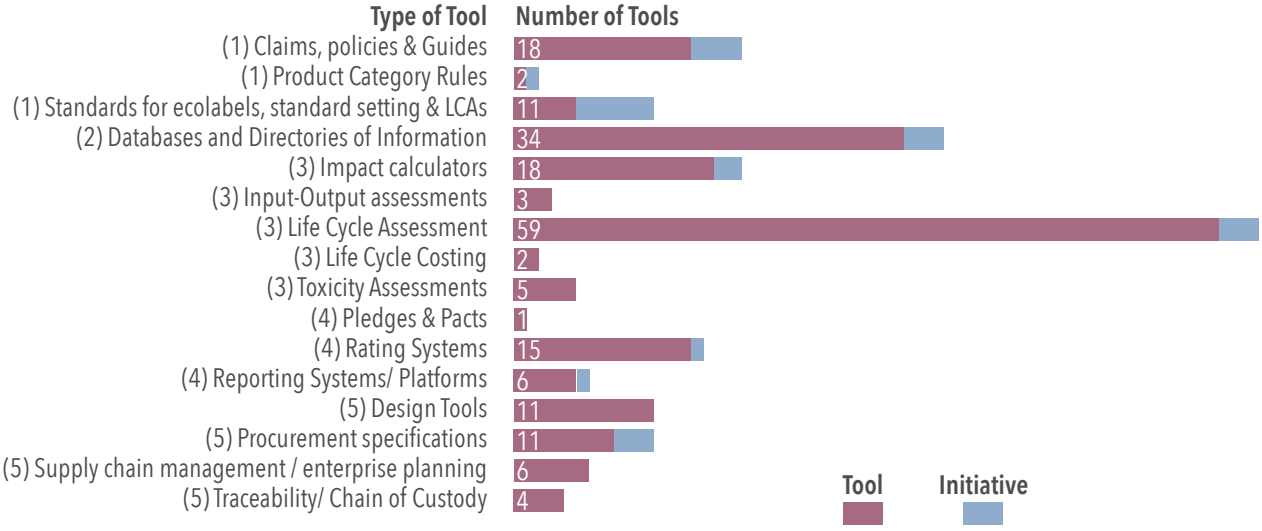
shake-out can be expected to reduce the large quantities of tools. There is thus the need for a few standardised and effective tools.

Differences also exist in how the PSI provided by the tools is used. Those for consumers are mostly focused on awareness, whereas professional tools centre on hotspot identification and resource optimisation.

Figure 5 shows that 29% of these tools and initiatives are LCA ones and comprise the largest category. In this group, 15% of the LCA tools had a global presence, while the remaining ones had a primary presence in North America, Europe and Australia.

Figure 5: Tools and initiatives categorised by type



Harmonising initiatives for LCA tools were only evident in those regions. The least prominent tools employed for the sustainability of products were LCC and Pledges & Pacts, at least as far as we could trace them.

When assessing the initiatives, approximately half of the 22 types of tools had associated harmonising initiatives. The standards for ecolabels, standard setting and LCAs have the highest number of harmonising initiatives. Examples of these include the ISEAL Code of Good Practices,[24] the GEN GENICES framework,[25] the African Ecolabelling Mechanism[26] and the Roundtable for Sustainable Palm Oil.[27] Tools without any harmonising initiatives — that is, those without any blue bars in the chart above — are those least prominent in quantity, except for design tools (e.g. SolidWorks Sustainability and AutoDesk Sustainable Design for Manufacturing). A majority of the harmonising initiatives were

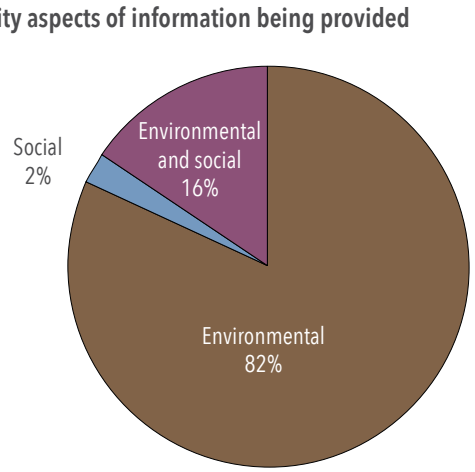
24 http://www.isealalliance.org/our-work/defining-credibility/codes-of-good-practice

25 http://www.globalecolabelling.net/about/activities/genices/index.htm

26 http://www.arso-oran.org/?page_id=45

27 http://www.rspo.org/

Figure 6: Addressed sustainability attributes



concentrated in North America, Europe and Australia, but many are global in their reach. Examples of harmonising initiatives include the Sustainability Consortium,[28] Sustainable Apparel Coalition[29] and the Global Sustainable Tourism Criteria.[30]

When assessing the regional presence of tools reviewed in this study, it was found that roughly half of them were present in Europe, North

28 http://www.sustainabilityconsortium.org/

29 http://www.apparelcoalition.org/

30 http://www.gstcouncil.org/

America and, to some extent, in Australia. Over one third of the tools and initiatives were available throughout the world, but only 7% of them were solely present in Asia or Africa. Almost all LCA tools were either available globally or in the aforementioned group of three continents.

Most (82%) of the sustainability attributes being addressed are environmental, not social, aspects. In some cases, both social and environmental attributes are presented, while far fewer tools present social attributes only (Figure 6).

Of all these tools and initiatives developed for the sustainability of products, almost 86% have a life cycle perceptive in coverage. This does not apply to all qualitative ecolabels that are grouped into one type in this study, but does apply to quantitative EPD, listed separately in Table 2. The importance of full life cycle coverage is tied to the method's ability to capture key issues and avoid burden shifting. Life cycle-based concepts are also able to reach up and down the supply chain and involve multiple stakeholders, from raw material producers to end-use consumers.

The proliferation of certain tool types, along with the existence of a growing number of initiatives to co-ordinate and harmonise the tools, indicates that new, divergent tools are being continually developed.

Figure 7 indicates that NGOs and non-profits are responsible for the development and operation of the majority of tools and initiatives.

Figure 7: Classification of tools and initiatives based on the organizations managing the tool

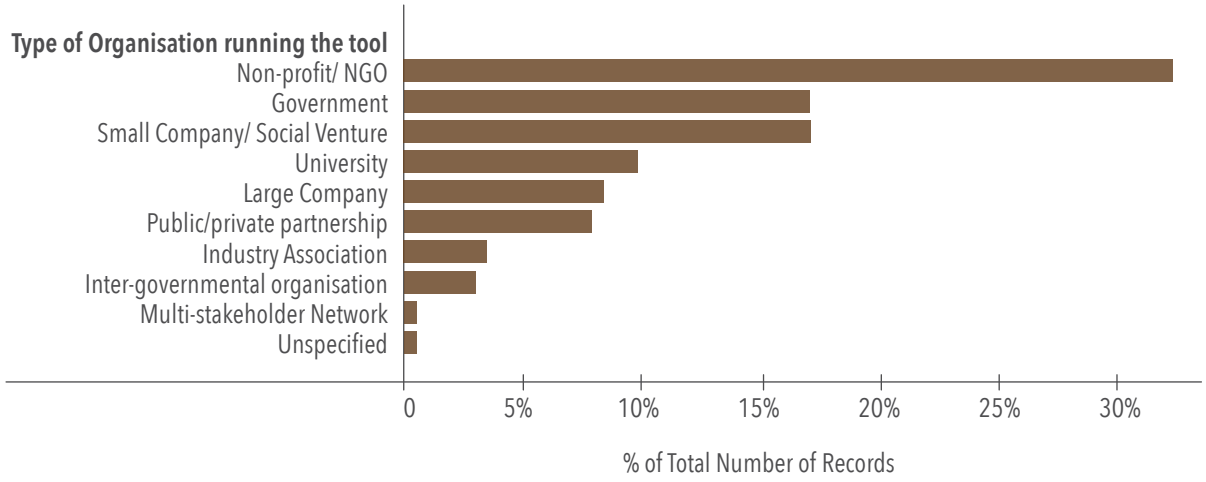
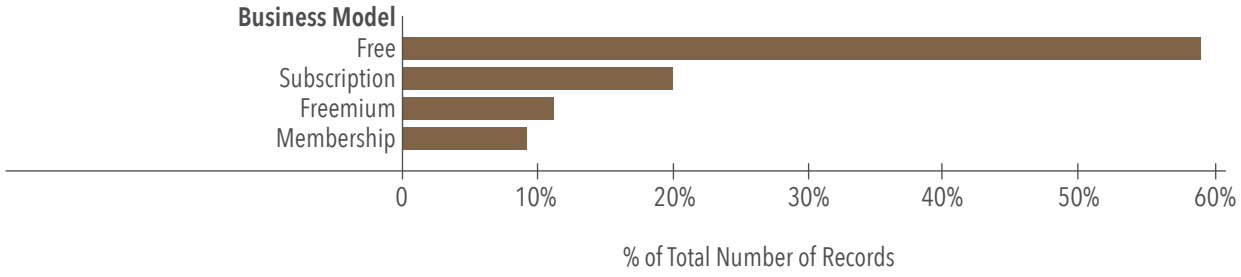


Figure 8: Business model associated with tools for sustainability products



The tools developed by governmental agencies and social ventures, together, are roughly equivalent to the percentage of tools developed by non-profits. In other words, this shows that non-for-profits, governmental agencies and social ventures play a crucial role in developing tools for the sustainability of products.

The tools and initiatives reviewed in this study utilise several different business models to support their efforts (Figure 8). More than half of them are offered free of charge, utilising alternative means of funding. "Freemium" offerings provide a basic version free and then additional content or features are only available to paying subscribers. Membership or subscription offerings are likely to be geared more toward a professional audience, because a consumer is unlikely to spend money to gain additional sustainability information.

5.3 Tools and their Implications

The landscape structure and analysis reveal some important implications and gaps in the state of sustainability product information today.

Ecolabels and unverified claims are the two categories of tools with consumer-facing information used on products. The majority of the tools are used off products behind the scenes. According to the Ecolabel Index (Ecolabel Index, 2012), there are about 459 ecolabels in 197 countries that provide product information to consumers.

Tools like Good Guide[31] and Stiftung Warentest[32] are exceptions that provide sustainability ratings on products and that can be accessed on-line via smart phones and other Internet-enabled devices. On the other hand, the majority of the world's population, particularly in the developing world, will be limited by the financial capability to purchase smart phones and gain access. These ranking tools are often linked to products via the Universal Product Code (UPC) bar found on all manufactured products sold in large retail stores and can be used in on-the-spot decision-making, similar to on-product sustainability information. Although the Good Guide is used for products in North American markets, the potential of this technology is significant. The 2013 report on the consumer goods and retailer industry (Capgemini Consulting, 2013) has identified the use of barcode standards

31 www.goodguide.com

32 www.test.de

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for communicating PSI as one high-profile recommendation.

The target audience of these tools is not limited to only one group of users. Tools that are intended for both the individual/household consumer and the professional user include directories, impact calculators, reporting platforms and ecolabels, among others. In cases such as ecolabels, the tools do indeed serve both user groups, while in cases such as impact calculators the user group will depend on the specific tool and the market it is trying to serve.

Although the sharing of tools democratises their usage, other user groups do not have access to them, often due to lack of awareness or insufficient financial capacity. The survey of emerging economies conducted for this study indicates that some consumer groups and small-scale producers do not have access to both the freely-available tools and the premium tools exclusive to manufacturers and institutional buyers. Financial ability and knowledge capacity have been clearly identified as barriers to access.

The two main user groups being served by off-product information tools are producers who want to assess, manage and communicate the sustainability aspects of their products and professional purchasers who want to assess and buy products.

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Most of the catalogued tools are voluntary in nature and created by entities outside of governmental structures, which indicates the proactive nature of the demand and supply of PSI. Governments do set some rules, such as incorporating sustainability aspects into building or safety codes for products, or by regulating the use of certain terms in marketing of claims; however, by and large, the information that is being created exists outside the realm of government mandates. This obviously varies by region, given that some governmental entities prefer to structure the marketplace via other non-regulatory channels.

Most behind-the-scenes tools were found to provide information on the sustainability attributes of products, as opposed to actually rating the product's sustainability. This indicates that a majority of the tools do not provide value judgments on the sustainability attributes, but rather leave it to the users to draw their own conclusions. According to the author, this is exactly the issue consumer organisations have: they say consumers cannot really be expected to do this, making the entire effort misleading and confusing.

Lastly, the rise of several databases and entities tracking and consolidating information on the information tools is itself an indicator of both the landscape's complexity and of the demand from stakeholders for greater cohesiveness and consolidation of information. Formal attempts to provide consistency across the landscape—from voluntary standards to government regulations and industry collaborations—have been sought; however, no organisation has the authority across all jurisdictions to ensure that information on the sustainability of products forms a comprehensive whole.

6. DISCUSSION AND RECOMMENDATIONS

Charting the vast array of stakeholders, their initiatives and the multitude of tools they have developed is not a trivial task, and a short report cannot capture all details. We should not be surprised about the complexity; at the start of the second chapter, we tried to summarise the fundamental complexity around sustainability information based on LCA, as mentioned in the introduction. When we add a description of stakeholders and actual tools, we add additional complexity, as stakeholders generally have a tendency to work for their own interests and the tools frequently have a deliberate focus and, thus, reduced scope. Very few actors have a complete overview, and creating one is what we tried to do in this report.

When we focus, and thus narrow our scope, on the question of how to empower and inform, we can see a number of challenges that need to be overcome.

Aligning PSI tools and procedures and improving inter-operability

Our report shows that, although the market pull is not clearly defined, there is no lack of tools. The problem is that there are too many tools that are not always co-ordinated and aligned, and this creates confusion and inefficiency. Traditionally, many organisations, especially labelling schemes, have invested significant efforts into the credibility of their systems, either according to the ISO principles for Types I, II or III. Although the most important of these initiatives have been organising themselves in global initiatives like GEN, ISEAL and GEDnet, there is a general lack of co-ordination between them.

Most labelling organisations represent a country, and their processes are based on consultation with national industries and stakeholders. During the harmonisation process, they perceive that they may lose a say, and common approaches cannot always address national policy goals and serve national interests.

In addition, trade barrier concerns, discussed in section 2.1, may be a more critical obstacle for harmonisation efforts. Most of the tools and initiatives are done by developed countries and, thus, their content and process (such as a focus primarily on environmental issues) can become dominant in international discussions and do not always address the issues pertinent to the developing world. However, sector initiatives like the Apparel Coalition or The Sustainability Consortium are becoming an important trend due to business's ability to operate beyond national boundaries through supply chains. In addition, harmonisation is not always desirable due the environmental and social differences between the regions.

As a result, we believe that, instead of harmonisation, efforts should be to align the procedures and enhance inter-operability of systems. This means that there can be different and competing tools, but it becomes clear how users and stakeholders can use them next to each other or understand which the best one is for their purpose. Such a landscape, with inter-operable tools, will make room for innovation and increase effectiveness.

Inter-operability can refer to the following:

- Aligning terms and definitions in different languages and defining ways to overcome language barriers;
- Aligning underlying methods for LCA databases based on the UNEP/SETAC Global Guidance Principles; developing minimum data quality documentation principles, agreed by the international community, and enhancing the inter-operability of databases and alignment of nomenclature within them;
- Developing guidance on reviewing and verification;
- Developing a PSI registry and web repositories where links to and other information on tools and initiatives can be found. If product categories need to be

used, use the same UN Central Product Classification;
- Alignment on a common scope or scopes covered by the tools.

Although these will not solve all the challenges, less confusion is likely, data and information can better flow between the various systems and a vast increase in the user base can be achieved. Inter-operability will not happen on its own, as it requires dedicated time and resources from system providers. Both incentives and structure are needed, as well as a common vision and understanding of problems to be overcome, a roadmap for how to get there and an idea of how each actor can contribute in a tangible way.

Recommendation 1: Leadership is needed to align the interest of the operators and managers of different tools, national governments as well as private sector initiatives. This means that a multi-stakeholder body representing various groups, including governments and private organisations, should convene based on an agreed modus operandi and develop consensus on the basic rules of the game: a global guidance for inter-operability of PSI tools (their development and use). The above-mentioned points could be considered in such guidance. The 10YFP consumer information programme,[33] launched on 1 July 2014 and supported by the programme leads, provides the space, structure and leadership for the development of a global guidance for inter-operability of PSI tools and can conclude it through a similar process.

The aim would be to make the tools inter-operable, which would leave room for adjustment to national policy priorities and needs, and manage the concern over trade barriers while reducing uncertainty in the information that the tools produce. Such efforts could also start at the regional level, which would allow for improved quality and robustness of information and related processes.

33 UNEP. New Programme to Strengthen Consumer Information for the Shift to Sustainable Consumption. UNEP; 1 July 2014. Available from: http://www.unep.org/newscentre/default.aspx?DocumentID=2791&ArticleID=10935

Taking a life cycle perspective

Single-issue labels such as Fair Trade, FSC and MSC are increasingly important. This is not only because consumers understand and act upon them, but because they also help many companies to standardise and certify their supply chain. A well-known example is the battle for Fair Trade chocolate.[34] Companies have recognised that such schemes not only contribute to a fair world and help farmers become more productive and develop better chocolate, but also address the potential lack of cacao supply in the coming decade.

Single issue labels successfully address some of the key concerns of the consumers. However, sustainability encompass various impacts categories and many steps from extraction to consumption, including disposal and use phase. As such, some ISEAL members have started to extend the scope of their

34 Just Food. Interview: Divine Chocolate battles pressure on Fairtrade specialists. Just Food; 2013. Available from: http://www.just-food.com/interview/divine-chocolate-battles-pressure-on-fairtrade-specialists_id122618.aspx

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work to cover the life cycle (The Responsible Jewellery Council[35], for example. ISEAL also has a working group in place to consider this further. This would allow better alignment with other labels, ensuring that information provided by these labels is not only credible but robust, science-based and contributes to the overall improvement without shifting burden and significant trade-offs.

Further, social assessment along the life cycle is an emerging field. As social impacts are not easy to quantify, new tools will most likely be upcoming. The recently-launched Social LCA Methodological Sheets (UNEP/SETAC 2013) might help to boost the implementation of social and socio-economic dimensions in PSI tools.

Recommendation 2: Encourage major PSI label and tools associations to use life cycle-based principles as criteria for the alignment of their work. This could cover the assessment phase while still communicating on some of the main issues currently covered by given programme. This process could be supported by international forums or organisation such as United Nations Forum of Sustainability Standards or UNEP, the latter of which has been actively working with both ISEAL and GEN.

35 Responsible Jewellery Council. Available from: http://www.isealalliance.org/online-community/organisations/responsible-jewellery-council

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International stakeholders dialogue: including the developing world perspective

An important task in this wide array of tools, stakeholders and corresponding drivers and hurdles is to address the apparent backlog in developing countries and the fear that sustainability information may be used as a trade barrier. This is a legitimate concern because certain procedures required by tools may portray producers from developing countries negatively due to their environmental context. For instance, soil (and biomass) carbon emissions from land use change are responsible of a significant share of current global greenhouse gas emissions; the discussions in the context of greenhouse gas accounting standards suggest considering emissions from land converted within the last 20 years only. In developed countries, such conversions hardly take place nowadays, and the associated emissions already took place a long time ago and no longer need to be counted, thus potentially placing developing countries (where deforestation is presently localized) at a disadvantage. However, the drivers for use of such information must be shared and understood: the purpose is not to stigmatize certain sourcing regions, but to identify key environmental hotspots in order to prioritize improvement actions.

Still, in view of the lack of a common standard, there is a risk (and it is happening, as this study shows) that various stakeholders will develop their own standards. This could become much more problematic for developing countries, as exporters, who will need to comply with many different rules. Until now, this dichotomy has lingered in the background; but, if sustainability will become increasingly important, this can become a real issue. If governments cannot

solve this, the industry initiatives will set the standards with little control and input from other groups and their perspectives.

Therefore, the challenge is how to go beyond these two extremes and develop solutions based on consensus and inter-operability. The rest of recommendations become obvious and seem to be the way forward. In addition, there is a need for better communication and capacity development in both developing and developed countries. The discussions will benefit from a better understanding of what LCA-based methods can and cannot do, what their strength and weaknesses are and how uncertainties can be assessed, etc. Such knowledge will create a better environment in which to discuss and negotiate common standards.

Recommendation 3: Facilitating the inclusion and engagement of representatives of developing and emerging economies in international efforts on PSI for the balance of voices from all regions in finding solutions to challenges faced by PSI. International statistics indicate that the proportion of global middle class consumers in 20 years will be dominated by these regions and not industrialized countries (e.g. by 2030, two-thirds of the global middle class will be residents of the Asia-Pacific region[36]) making their consumption an important driver for PSI.

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6.1 Developing an aligned global vision among stakeholders

The retailers' perspective shows that, in fact, not all of them believe that consumers should be informed with labels. This is what some retailers state, as labels create confusion and doubt, which are the last thing that they want to convey. Companies like Tesco went a long way toward developing specific consumer information, but have now changed their policy to align more with the other retailers in The Sustainability Consortium. Retailers see their primary goal as delivering a good brand reputation.

A somewhat similar attitude can be seen with some brand owners. Although they work hard to improve the sustainability performance of their products, they are nevertheless reluctant to make specific claims about the sustainability of their products. Examples of this include Unilever, which has pledged very significant improvements for its products by 2020, but which does not communicate these improvements for each one. In Japan, the government rolled out very extensive, highly-subsidised services to support companies with carbon labelling and strong financial support. To date, however, very few companies have started to put these labels on products, even if they have already estimated the corresponding indicators (e.g. carbon footprint).[37]

Consumer organisations are also uncertain about labels, especially quantitative ones.

36 Ernst & Young. By 2030 two-thirds of global middle class will be in Asia-Pacific. London; 25 April 2013. Available from: http://www.ey.com/GL/en/Newsroom/News-releases/News_By-2030-two-thirds-of-global-middle-class-will-be-in-Asia-Pacific

37 Author's personal communication

They find them confusing and, therefore, misleading. They do, however, understand labels presenting the performance of products relative to competing products. A good example of this type is the obligatory European energy label. Several studies showed that consumers do not attach much value to a label; only a few well-known labels are trusted and recognised (Big Room and WRI, 2011; ANEC, 2012). The quantitative labels seem to have even less of an impact, as not all consumers have an understanding of what the numbers mean. A recent study for the Sustainability Consortium working group on consumer science shows that carbon labelling can be seen as the sustainability measure that has the least credibility and the lowest potential by consumers to act upon. Similarly, in a keynote speech delivered by Unilever in the 2011 Lifecycle Management Conference, the representative explained that, although an average supermarket has around 50,000 different products, an average consumer typically only buys 50 and makes a choice among about 300 that are familiar to her or him. The presenter made the point that no consumer can understand, nor take the time to assess, the information on all 50,000 products available on the retailer's shelves, even if that person is highly motivated.

So far, the development of PSI tools have been blooming with various propositions from various stakeholders. In order to gain efficiency, the big challenge is now to develop among the stakeholders a common global vision.

Moreover, there is need for PSI managers, developers and operators to recognise their educational role and that the information that is provided not only serves the immediate reaction toward a purchasing action but also develops the consumer of the future. With this in mind, new and adapted PSI communication strategies could be developed in order to move toward more sustainable products. Some of the leading initiatives such as EU initiated PEF/OEF project and French initiative on product environmental footprinting and communication have already started doing so.

Recommendation 4: Move away from the belief that more information is better than less information, and that labels are the only answer. Instead, create an international dialogue between brand owners, retailers, consumer organisations and policy-makers in order to acknowledge the different cultures to develop a better understanding of what consumers will recognise to be information that is credible and that they can act upon. A pre-condition for this dialogue is the acknowledgement by these stakeholder groups of their educational responsibility along the PSI communication process. It is recommended to keep this in mind and develop new and adapted PSI communication strategies for more sustainable products.

6.2 Concluding remarks

The landscape of tools, initiatives and stakeholders is not only complex and fragmented, but also rapidly evolving in various directions. The jury still seems to be out on which development(s) will become the leading paradigm. Many solutions are developed and promoted, but the demand side is not very clear. This is why we think the issue of developing an agreed global view and guidance on the issue of informing and empowering consumers is key, especially if the growing global middle class consumers from developing and emerging economies have to be an active partner in this process.

7. REFERENCES AND BIBLIOGRAPHY

Accenture. Businesses are struggling to keep up with the demand for sustainable products and services. Accenture; 2012a. Available from: *http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Long-Term-Growth-Short-Term-Differentiation-and-Profits-from-Sustainable-Products-and-Services.pdf*

Accenture. Long-Term Growth, Short-Term Differentiation and Profits from Sustainable Products and Services: A global survey of business executives. Accenture; 2012b [cited 18 December 2012]. Available from: *http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Long-Term-Growth-Short-Term-Differentiation-and-Profits-from-Sustainable-Products-and-Services.pdf*

AFNOR/ADEME. BP X30-323 General principles for environmental labelling of consumer products - Part 0: General principles and methodological framework. AFNOR/ADEME; 2011.

Ahbe S, Braunschweig A, Müller-Wenk R. Methodology for Ecobalances based on Ecological Optimisation. BUWAL (SAFEL) Environment Series No. 133; 1990.

ANEC. ANEC position- Environmental assessment goes astray: A critique of environmental footprint methodology and its ingredients. ANEC; 2012. Available from: *http://www.anec.eu/attachments/ANEC-ENV-2012-G-008final%20(3).pdf*

BAFU. Feasibility study for environmental product information based on life cycle approaches. Bern: BAFU; 2011.

Big Room and World Resources Institute. 2010 Global Ecolabel Monitor: Towards Transparency. Big Room and World Resources Institute; 2011 [cited 12 October 2012]. Available from: *http://www.ecolabelindex.com/downloads/Global_Ecolabel_Monitor2010.pdf*

Binswanger M. Technological Progress and Sustainable Development: What about the Rebound Effect? Ecol Econ; 2001: 36(1): 119-132.

Boulstridge E, Carrigan M. Do Consumers Really Care About Corporate Responsibility? Highlighting the Attitude-Behaviour Gap. Journal of Communication Management; 2000: 4(4): 355-368.

British Standards Institute. PAS 2050: 2011 Specification for the assessment of the life cycle greenhouse gas emissions of goods and services. British Standards Institute; 2011.

BSR and GlobeScan. State of Sustainable Business Poll 2012. BSR and Globe Scan; 2012 [cited 18December 2012]. Available from: *https://www.bsr.org/reports/BSR_GlobeScan_State_of_Sustainable_Business_Survey_2012.pdf*

Business for Social Responsibility and Forum for the Future. Eco-promising: communicating the environmental and social credentials of your products and services. London: Business for Social Responsibility and Forum for the Future; 2008.

CLCD (2014). Chinese Life Cycle Database; 2014. Available from: *http://www.itke.com.cn/*

Capgemini Consulting. The Future of Standards in the Consumer Goods & Retail Industry. Capgemini Consulting; 2013. Available from: *http://www.gs1.org/docs/Cagemini_Future_of_Standards_Exec_Summary.pdf*

Consumers International. The relationship between supermarkets and suppliers: What are the implications for consumers; 2012; Available from: *http://www.itke.com.cn/http://www.consumersinternational.org/media/1035301/consumer%20detriment%20briefing%20paper%20sept2012.pdf*

Consumers International. Ethical Trade Fact-Finding Process; 2009; Available from: *http://www.consumersinternational.org/media/391773/etfpphase1summary.pdf*

de Haes H, Finnveden G, Goedkoop M, Hauschild M, Hertwich E, Hofstetter P, et al., editors. Life-Cycle Impact Assessment: Striving Towards Best Practice. Brussels: Society of Environmental Toxicology and Chemistry; 2002.

Deloitte and Grocery Manufacturers Association. Finding the green in today's shoppers: Sustainability trends and new shopper insights. Deloitte and Grocery Manufacturers Association; 2009 [cited 04 May 2015]. Available from: *http://www.gmaonline.org/downloads/research-and-reports/greenshopper09.pdf*

Ecolabel Index [Internet]. Vancouver: Ecolabel Index; 2012 [cited 12 September 2012]. Available from: *http://www.ecolabelindex.com/*

Elkington J, Müller F. Good News & Bad: The Media, Corporate Social Responsibility and Sustainable Development. SustainAbility, UNEP and Ketchum; 2002 [cited 26 May 2015]. Available from: *http://www.sustainability.com/library/good-news-bad#downloads*

European Commission (2013a). Annex II-Product Environmental Footprint (PEF) Guide to the Commission Recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations; 2013 [cited 04 May 2015]. Available from: *http://www.lesenr.fr/actualites/7_GUIDE_PEF.pdf*

European Commission (2013b). Annex III- Product Environmental Footprint (PEF) Guide to the Commission Recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations; 2013. Available from: *http://ec.europa.eu/environment/eussd/smgp/pdf/Guidance_organisations.pdf*

Fischer-Kowalski M, Swilling M, von Weizsäcker EU, Ren Y, Moriguchi Y, Crane W, et al. Decoupling natural resource use and environmental impacts from economic growth. Nairobi: United Nations Environment Programme; 2011.

Freeman R E. Strategic Management: A stakeholder approach. Boston: Pitman; 1984.

Golden JS. An Overview of Ecolabels and Sustainability Certifications in the Global Marketplace. Duke University; 2010 [cited 1 December 2012]. Available from: *http://center.sustainability.duke.edu/sites/default/files/documents/ecolabelsreport.pdf*

Greenhouse Gas Protocol. A Corporate Accounting and Reporting Standard: Revised Edition. World Resources Institute, World Business Council for Sustainable Development; 2011 [cited on 15 October 2012]. Available from: *http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf*

Greenhouse Gas Protocol. Corporate Value Chain (Scope 3) Accounting and Reporting Standard. World Resources Institute, World Business Council for Sustainable Development; 2011 [cited on 15 October 2012]. Available from: *http://www.ghgprotocol.org/files/ghgp/public/Corporate-Value-Chain-Accounting-Reporing-Standard_041613.pdf*

Greenhouse Gas Protocol. Product Life Cycle Accounting and Reporting Standard. World Resources Institute, World Business Council for Sustainable Development; 2011 [cited on 15 October 2012]. Available from: *http://www.ghgprotocol.org/files/ghgp/public/Product-Life-Cycle-Accounting-Reporting-Standard_041613.pdf*

Hertwich E, van der Voet E, Suh S, Tukker A, Huijbregts M, Kazmierczyk P, et al. Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials. A Report of the Working Group on the Environmental Impacts of Products and Materials to the International Panel for Sustainable Resource Management. Nairobi: United Nations Environment Programme; 2010.

Hitchcock D, Schenck R, Gordy T. Directory of Sustainability Life Cycle Assessment Tools. International Society of Sustainability Professionals; 2011 [cited 1 November 2012]. Available from:*http://www.sustainabilityprofessionals.org/system/files/ISSP_Life_Cycle_Assessment_Tools_Directory.pdf*

International Institute for Sustainable Development. Sustainable Development Timeline. International Institute for Sustainable Development; 2012 [cited 12 September 2012]. Available from: *http://www.iisd.org/pdf/2012/sd_timeline_2012.pdf*

International Organization for Standardization. ISO 14064-1:2006 Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. Geneva: International Organization for Standardization; 2006.

International Organization for Standardization. ISO 14025:2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures. Geneva: International Organization for Standardization; 2006.

International Organization for Standardization. ISO 14020:2000 Environmental labels and declarations – General Principles. Geneva: International Organization for Standardization; 2000.

International Organization for Standardization. ISO 14021:1999 Environmental labels and declarations -- Self-declared environmental claims (Type II environmental labelling). Geneva: International Organization for Standardization; 1999.

International Organization for Standardization. ISO 14024:1999 Environmental labels and declarations -- Type I environmental labelling -- Principles and procedures. Geneva: International Organization for Standardization; 1999.

International Organization for Standardization. ISO 14044:2006 Environmental management -- Life cycle assessment -- Requirements and guidelines. Geneva: International Organization for Standardization; 2006.

International Organization for Standardization. ISO 14046 Life cycle assessment -- Water footprint -- Requirements and guidelines. Geneva: International Organization for Standardization; 2014.

International Organization for Standardization. ISO/TS 14067 Carbon footprint of products -- Requirements and guidelines for quantification and communication. Geneva: International Organization for Standardization; 2013.

Johnson & Johnson. The Growing Importance of More Sustainable Products in the Global Health Care Industry. Johnson & Johnson; 2012. Available from: *http://www.jnj.com/wps/wcm/connect/ef4195004cca13b8b083bbe78bb7138c/JNJ-Sustainable-Products-White-Paper-092512.pdf?MOD=AJPERES*

Jolliet O, Müller-Wenk R, Bare J, Brent A, Goedkoop M, Heijungs R, et al. The LCIA midpoint-damage framework of the UNEP/SETAC life cycle initiative. Int J Life Cycle Assess. 2004: 9(6): 394-404.

Kim Y-K, Forney J, Arnold E. Environmental Messages in Fashion Advertisements: Impact on Consumer Responses. Cloth & Textiles Res J. 1997: 15(3): 147-154.

King A, Lennox M, Barnett M. Strategic responses to the reputation commons problem. In: Hoffman M, Ventresca M, eds. Organizations, Policy and the Natural Environment. Stanford: Stanford University Press; 2002.

King B. Sustainable Brands: News and Views [Internet]. Survey Shows Americans Want to See CSR Results; 2012 [cited 15 December 15, 2012]. Available from: *http://www.sustainablebrands.com/news_and_views/articles/survey-shows-americans-want-see-csr-results*

Johnson S, Lacy P, Haywards R, McLean E, Jhanji A. The UN Global Compact-Accenture CEO Study on Sustainability 2013. United Nations Global Compact and Accenture; 2013 [cited 26 May 2015]. Available from: *http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-UN-Global-Compact-Acn-CEO-Study-Sustainability-2013.pdf*

Leadership in Energy & Environmental Design. Washington: U.S. Green Building Council [cited 15 October 2012]. Available from: *http://new.usgbc.org/leed*

McCoy M. Greener Cleaners. Chem. Eng. News. 2008: 86(3): 15-23.

McKinsey & Company. Survey of consumers in Brazil, Canada, China, France Germany, India, the UK and the US. The McKinsey Quarterly. March 2008.

Meadows D.H, Meadows D.L, Randers J, Behrens W. Limits to Growth, New York: New American Library, 1972.

Mobi Thinking [Internet]. Global mobile statistics 2012 Home: all the latest stats on mobile Web, apps, marketing, advertising, subscribers, and trends; 2013. Available from: *http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats*

National Geographic, GlobeScan. Greendex 2012: Consumer Choice and the Environment: A Worldwide Tracking Survey. Toronto: GlobeScan; 2012 [cited 26 May 2015]. Available from: *http://images.nationalgeographic.com/wpf/media-content/file/NGS_2012_Final_Global_report_Jul20-cb1343059672.pdf*

National Geographic, GlobeScan. Greendex 2014: Consumer Choice and the Environment: A Worldwide Tracking Survey. Toronto: GlobeScan; 2014 [cited 22 May 2015]. Available from: *http://images.nationalgeographic.com/wpf/media-content/file/2014_Global_Report-cb1411689801.pdf*

Nicholls A, Lee N. Purchase Decision-Making in Fair Trade and the Ethical Purchase Gap: Is there a Fair Trade Twix? J Strat Market. 2006: 14(4): 369-386.

PRé Consultants bv. Mapping Retailer Sustainability Activities. Amersfoort: PRé Consulting bv; 2013.

Rosenbaum RK, Bachmann TM, Gold LS, Huijbregts MAJ, Jolliet O, Juraske R, et al. USEtox—the UNEP-SETAC toxicity model: recommended characterisation factors for human toxicity and freshwater ecotoxicity in life cycle impact assessment. Int J Life Cycle Assess. 2008: 13 (7): 532–546.

Singapore Environment Institute. The Worldwide Sustainability Timeline. Singapore Environment Institute; 2005 [cited on 12 September 2012]. Available from: *http://www.nea.gov.sg/cms/sei/SEIsustainabilitytimeline.pdf*

Sonnemann G, Valdivia S. (2013). Life cycle thinking and the use of life cycle assessment in sustainable consumption and production policies - Exchange of experiences and the need for quality data availability and capacity building (Report based on the 2nd Intergovernmental Meeting on Life Cycle Assessment on 10 April 2013 and the two-day preparatory meeting organised by UNEP and the Life Cycle Initiative); 2013. Available upon request at the Secretariat of the UNEP/SETAC Life Cycle Initiative.

Steen B. A systematic approach to environmental priority strategies in product development (EPS). Version 2000 – General system characteristics. Gothenburg: Chalmers University of Technology; 1999.

Elkington J, Müller F. Good News & Bad: The Media, Corporate Social Responsibility and Sustainable Development. SustainAbility, UNEP and Ketchum; 2002 [cited 26 May 2015]. Available from: http://www.sustainability.com/library/good-news-bad#downloads

The Nielsen Company. The Nielsen Global Survey on Corporate Social Responsibility: Doing Well By Doing Good; 2014 [cited 22 May 2015]. Available from: *http://www.nielsen.com/content/dam/nielsenglobal/apac/docs/reports/2014/Nielsen-Global-Corporate-Social-Responsibility-Report-June-2014.pdf*

United Nations. A 10-year framework of programmes on sustainable consumption and production patterns. Rio de Janeiro: United Nations; 2012. Available from *http://www.unep.fr/scp/pdf/10YFP_english.pdf*

United Nations Environment Programme. Evaluation of Environmental Impacts in Life Cycle Assessment. Paris: United Nations Environment Programme; 2003.

United Nations Environment Programme. Sustainable Consumption and Production for Development: Background Paper. Paris: United Nations Environment Programme; 2010. Available from: *http://www.unep.fr/scp/marrakech/dialogue/pdf/SCPforDevelopment_BGpap180610_final.pdf*

United Nations Environment Programme (2013a). Sustainable Public Procurement: A Global Review. Final Report. Paris: United Nations Environment Programme; 2013.

United Nations Environment Programme. The Business Case for the Green Economy: Sustainable Return on Investment. Paris: United Nations Environment Programme; 2012. Available from: http://www.unglobalcompact.org/docs/news_events/upcoming/RioCSF/partner_deliverables/The_Business_Case_%20for_The_Green_Economy.pdf

United Nations Environment Programme (2013b). The Impacts of Sustainable Public Procurement: Eight Illustrative Case Studies. Paris: United Nations Environment Programme; 2013.

United Nations Environment Programme. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. A Synthesis for Policy Makers. Nairobi: United Nations Environment Programme; 2011. Available from: *http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf*

United Nations Environment Programme. Towards Sustainable Production and Use of Resources: Assessing Biofuels. United Nations Environment Programme; 2009. Available from: *http://www.unep.org/pdf/assessing_biofuels.pdf*

United Nations Environment Programme and the Society for Environmental Toxicology and Chemistry. Global Guidance Principles for Life Cycle Assessment Databases: A Basis for Greener Processes and Products. Paris: United Nations Environment Programme; 2011. Available from: *http://www.lifecycleinitiative.org/wp-content/uploads/2012/12/2011%20-%20Global%20Guidance%20Principles.pdf*

United Nations Environment Programme and the Society for Environmental Toxicology and Chemistry. Guidelines for Social Life Cycle Assessment of Products. Nairobi: United Nations Environment Programme; 2009. Available from: *http://www.lifecycleinitiative.org/wp-content/uploads/2012/12/2011%20-%20Global%20Guidance%20Principles.pdf*

United Nations Environment Programme and the Society for Environmental Toxicology and Chemistry. The Methodological Sheets for sub-Categories in Social Life Cycle Assessment (pre-publication version). United Nations Environment Programme; 2013. Available from: *http://www.lifecycleinitiative.org/wp-content/uploads/2013/11/S-LCA_methodological_sheets_11.11.13.pdf*

United Nations Environment Programme, SEFI, Bloomberg. Global Trends in Sustainable Energy Investment 2010: Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency. Nairobi: United Nations Environment Programme; 2010. Available from: *http://www.unep.org/pdf/dtie/GlobalTrendsSustainableEnergy_2010.pdf*

Wackernagel M. Land Use: Measuring a Community's Appropriated Carrying Capacity as an Indicator for Sustainability and Using Appropriated Carrying Capacity as an Indicator, Measuring the Sustainability of a Community. Reports presented to: UBC Task Force on Healthy and Sustainable Communities; 1991; Vancouver.

World Business Council for Sustainable Development. Sustainable Consumption: Facts and Trends from a Business Perspective. Geneva: World Business Council for Sustainable Development; 2008 [cited on 7 October 2012]. Available from: http://www.saiplatform.org/uploads/Modules/Library/WBCSD_Sustainable_Consumption_web.pdf

World Economic Forum. Sustainability for Tomorrow's Consumer: The Business Case for Sustainability. Geneva: World Economic Forum; 2009 [cited on 2 April 2013]. Available from: *http://www3.weforum.org/docs/WEF_CI_SustainabilityForTomorrowsConsumer_Report_2009.pdf*

World Economic Forum. Redesigning Business Value: A Roadmap for Sustainable Consumption. Geneva: World Economic Forum; 2010 [cited on 28 September 2012]. Available from: *http://www3.weforum.org/docs/WEF_RedesigningBusinessValue_SustainableConsumption_Report_2010.pdf*

8. APPENDICES

Appendix I: Launch Dates of Product Sustainability Tools and Initiatives

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
Label Look Up	NRDC	US	1970	4	T
International Federation of Organic Agriculture Movements (IFOAM)	IFOAM	Int	1972	4	I
Green Pages	Green America	US	1983	4	T
The WERCS	The Wercs		1987		T
PROSA (Product Sustainability Assessment)	Institute for Applied Ecology		1987		T
SimaPro	PRé	NL	1990	3	T
Guides for the Use of Environmental Marketing Claims	US Federal Trade Commission	US	1991	1	T
GaBi	PE International	GE	1991	3	T
Guidelines on the use of Environmentally Oriented Claims in Marketing	Finland, Kuluttaja Consumer Agency and Ombudsman	Fi	1992	1	T
Building Green	Building Green		1992		T
Environmental Working Group	Environmental Working Group		1993		I
Green Building Alliances Green Product Labelling Grid	Green Building Alliance	US	1993	3	T
REGIS 2.3	sinum AG	Su	1993	3	T
Global Ecolabeling Network -GENICES	GEN	Int	1994	4	T
Umberto 5.5	ifu Hamburg GmbH	Ge	1994	3	T
LCA Ts, services and Data	European Commission JRC	EU	1995	1	T
EIO-LCA CMU Database	Green Design Institute of Carnegie Mellon	US	1997	2	T
Nano Life Cycle Risk Assessment	CLF Ventures		1997		T
EcoInvent	EcoInvent		1997		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
The GHG Protocol - Value Chain Initiative- a Carbon Footprint standard (Scope 3)	WBSCD/WRI		1998-2010		T
US EPA Database of Environmental Information	US EPA		1999		T
US EPA EPP	US EPA		1999		T
EcoTox	US EPA		1999		T
CLASP	CLASP		1999		T
The Sustainability Radar	University of St Gallen, Switzerland and INSEAD Fontainbleau, France		1999		T
GEDNET	Gednet		1999		T
Green Vehicle Guide	US EPA		2000		T
Guidelines for Making and Assessing Environmental Claims	European Commission, Directorate-General Health & Consumer Protection		2000		T
Top Ten	EU/WWF		2000		T
LCA Food Database	Faculty of Agricultural Sciences, Aarhaus University of Denmark		2000		T
USES-LCA	Radboud University Nijmegen		2000		T
SALCA	Agroscope Reckenholz-Tänikon Research Station ART		2000		T
ISO Standards	ISO		2000		T
AIST-LCA Ver.4	National Institute of Advanced Industrial Science and Technology (AIST)		2000		T
U.S. Life Cycle Inventory (LCI) Database	National Renewable Energy Laboratory		2001		T
ecoCompare	Product Ecology		2001		T
Roundtable for Sustainable Palm Oil	RSPO		2001		I
WISARD 4.0	ecoo-bilan PWC		2001		T
Enablon	Enablon		2001		T
What's in your paper?	Environmental Paper Network		2002		T
Modular MSWI Model 1.0	GreenDeltaTC		2002		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
Eco-Buy	Centre of Excellence in Environmental Purchasing		2002		T
GaBE project	Paul Scherrer Institute		2002		T
GEMI water sustainability T	Global Environmental Management Initiative		2002		T
Credit 360	Credit360		2002		T
Eco-Quantum	IVAM University of Amsterdam		2002		T
JEMAI-LCA Pro ver.2	Japan Environmental Management Association for Industry (JEMAI)		2003		T
Greener Choices Labels Online	Consumers Association (US)		2003		T
State of Sustainability Initiatives	IISD		2003		T
Global Footprint Network	Global Footprint Network		2003		T
FarmGas Emissions Calculator	Australian Farm Institute		2004		T
Energy Efficient Procurement - The DEEP Tkit-	ICLEI		2004		I
TrainEE	GreenDeltaTC		2004		T
Skin Deep	Environmental Working Group		2004		T
TESPI	ENEA - Italian National Agency for New Technology, Energy and the Environment		2004		T
The Int. EPD System®	SEMCO		2004		I
CMLCA	Leiden University		2004		T
KCL-ECO 4.0	Oy Keskuslaboratorio-Centrallaboratorium Ab, KCL		2004		T
EcoSpecifier	EcoSpecifier		2004		T
Sedex	Sedex		2004		T
ICLEI Procura+	ICLEI		2004		I
Sustainable Packaging Coalition	Greenblue		2004		I

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
eVerdEE v.2.0	ENEA - Italian National Agency for New Technology, Energy and the Environment		2004		T
Kijk of het Klopt – 'Check if it is Correct'	Foodlog.nl		2005		T
WashRight	International Association for Soaps, Detergents and Maintenance Products		2005		I
CSR Compass	Ministry of Business and Growth Denmark		2005		T
e-DEA	GreenDeltaTC		2005		T
Paper Calculator	EDF		2005		T
EPAT	GreenBlue		2005		T
COMPASS (Comparative Packaging Assessment)	Sustainable Packaging Coalition (SPC)		2005		T
Responsible Purchasing Network	RPN		2005		T
PIQET	Sustainable Packaging Association		2005		T
Environmental Impact Estimator V3.0.2	Athena Sustainable Materials Institute		2005		T
Harvest Mark	YottaMark		2005		T
WRATE	UK Environmental Agency		2006		T
The Buy Fair Guide	ICLEI		2006		T
AirConLCA	Center for Water and Waste Technology		2006		T
WAMPS	IVL Swedish Environmental Research Institute		2006		T
Pharos Project	Health Building Network		2006		T
Toxipedia	Toxipedia		2006		T
The UNEP/SETAC Database Registry	UNEP/SETAC		2006		T
DDWiki	Carnegie Mellon University		2006		T
E3IOT	Leiden University		2006		T
DPL1.0	IVAM University of Amsterdam		2006		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
The Boustead Model 5.0.12	Boustead Consulting Limited		2006		T
GSCP - Global Social Compliance Programme	Consumer Goods Forum		2006		T
EcoIndex	EcoIndex		2006		T
CleanGredients	GreenBlue		2006		T
GEMIS version 4.4	Oeko-Institut (Institute for applied Ecology), Darmstadt Office		2007		T
A shoppers'guide to green labels	DEFRA		2007		T
Guide to green labels and Claims	Directgov		2007		T
ELCD Database	European Commission		2007		T
Social Hotspots Database	Social Hotspots Database		2007		T
CCaLC	NERC, Carbon Trust		2007		T
openLCA framework	GreenDeltaTC		2007		T
The CEO Water Mandate	Global Compact		2007		I
BuyGreen	Buy Green		2007		T
The Greenwash Guide	Futurra		2007		T
Stan 1.1.3	Vienna University of Technology		2007		T
The Greenwashing Index	EnviroMedia Social Marketing / University of Oregon		2007		T
Green2Green	GreenBlue		2007		T
Ecolabelindex.com	Big Room		2007		T
Good Guide	Good Guide		2007		T
French Grenelle de l'Environment	French Ministry of Environment, Energy, SD and Seas		2007		I
The Procurement Scorecard (xls)	ICLEI		2007		T
FairMatch Support	Fair Match		2007		T
Eco-Bat 2.1	Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud		2007		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
AMEE	AMEE		2007		T
ECODESIGN X-Pro	EcoMundo		2007		T
EIME V3.0	CODDE		2007		T
Green-E	www.green-e.ch		2007		T
Sabento 1.1	if Hamburg GmbH		2007		T
Environmental Claims: A Guide for Industry and Advertisers	Competition Bureau, Canada and Canadian Standards Association		2008		T
Ecolabels and Sustainability Claims Directory	NZ Government		2008		T
Green Public Procurement	European Union		2008		T
Green claims working group (ICPEN)	International Consumer Protection and Enforcement Network (ICPEN)		2008		T
Eco Audit	Granta Material Intelligence		2008		T
Ethical Consumer Guide	Ethical Consumer Group (Australia).		2008		T
USEtox (toxicology assessment)	UNEP/SETAC Life Cycle Initiative		2008		T
Seafood Source	Seafood Source		2008		T
World of Good	EBAY		2008		T
Chemsec SIN list	Chemsec		2008		T
Eco-Patent Commons	WBCSD		2008		I
The African Eco-labelling Mechanism (African EcoMark)	GTZ and UNEP		2008		I
Carbon Counted	Carbon Counted		2008		T
Brando Scope	BrandoScope		2008		T
The Global Water Footprint Network	WWF and WFN		2008		I
Sustainability life cycle assessment	the Natural Step		2008		T
Kompass	Swiss State Secretariat for Economic Affairs (SECO)		2009		T
Green Supply Guidelines	UK, Office of Gas and Electricity Markets		2009		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
Guidelines for Social LCA	UNEP/SETAC Life Cycle Initiative		2009		T
CALM	Country Land & Business Association		2009		T
DOLCETA	DOLCETA 2.0 Consortium		2009		I
BEES (Building for Environmental and Economic Sustainability)	National Institute of Standards and Technology (NIST)		2009		T
CleanRight	International Association for Soaps, Detergents and Maintenance Products		2009		T
Open IO	Sustainability Consortium		2009		T
Sierra Club's Green Home	Sierra Club		2009		T
environmental footprint comparison T	NCASI		2009		T
EuPeco	EACI		2009		T
Fieldprint Calculator	Field to Market Alliance		2009		T
Smart SPP	EU		2009		I
The Climate Registry	Partnership with no clear leader		2009		I
Field to Market Alliance	Joint partnership between several private companies and environmental organisations in the United States		2009		I
The Global Sustainable Tourism Criteria	UNFoundation, UNEP		2009		I
EkoBai	EkoBai		2009		T
LCA - Evaluator 2.0	GreenDeltaTC		2009		T
Better Cotton I	BCI		2009		I
iPoint	iPoint		2009		T
Carbonostics	CarbonOstics		2009		T
The South African Eco-endorsement programme	Indalo Yethu		2010		I
The Fair Trading Act – Guidelines for Green Marketing	New Zealand Commerce Commission		2010		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
Ethical and Environmental Marketing Claims Guideline	Nordic Consumer Ombudsmen		2010		T
Consumer Policy Tkit	OECD		2010		T
Sustainability Measurement and Reporting System (SMRS)	The Sustainability Consortium		2010		T
rank a Brand	RankaBrand		2010		T
WeGreen.de	WeGreen		2010		T
Globox	CML		2010		T
Ethiscore	Ethical Consumer		2010		T
Greener Product	Greener Product, LLC		2010		T
The Social Fingerprint	SAI		2010		T
Green Marketing and Trade Practices Act Business Guide	Australia Competition and Consumer Commission		2011		T
Carbon Claims and the Trade Practices Act Business Guide	Australia Competition and Consumer Commission		2011		T
Green Claims – Practical Guidance	UK, Department for Environment, Food and Rural Affairs		2011		T
Global Guidance Principles for LCA DB,	UNEP/SETAC Life Cycle Initiative		2011		I
Safer Chemicals I	Pure Strategies		2011		I
Economy Map	Individual (Jason Pearson)		2011		T
International Network of Product Sustainability Initiatives	Collaboration of 20 diverse stakeholders worldwide		2011		I
Handprinter	handprinter.org		2011		T
EcoDesign strategy wheel	TU Delft		2011		T
Earthster	New Earth		2011		T
SourceMap	Source Map		2011		T
SolidWorks Sustainability	Solidworks		2011		T
PackageSmart	EarthShift		2011		T
Brightway LCA software	Aveny		2011		T

Name of Tool or Initiative	Name of Organisation Responsible for Tool	Country	Start Date	Category (Fig. 4)	Tool or (T) Initiative (I)
Amcor's Advanced Sustainability Stewardship Evaluation T	Amcor		2011		T
Windchill LCC (formerly Relex Life Cycle Cost)	Windchill		2011		T
EcoDesk	ecoDesk		2011		T
Buy Smart	Buy Smart		2012		T
People 4 Earth	People 4 Earth		2012		T
PCR Library	IGPN		2012		T
Prosuite	European Coalition		2012		T
String	String Together		2012		T
LCM Capability Maturity Model,	UNEP/SETAC Life Cycle Initiative		2012		I
Green Marketing Pledge	Green Products Roundtable		2012		I
AutoDesk Sustainable Design for Manufacturing	AutoDesk		2012		T
Instant LCA Web Portal for Textile and Footwear	Intertek		2012		T
LCA calculator	IDC		2012		T
Guidance for Product Category Rule Development	PCR Guidance Development Initiative		2013		T
Social LCA Methodological Sheets (in press)	UNEP/SETAC Life Cycle Initiative		2013		T
Global Guidance on Product Sustainability Information Hotspots (work in progress)	UNEP/SETAC Life Cycle Initiative		2013		T

Appendix II: List of organisations interviewed

Organization
3M
ACV Brasil
African Ecolabel Mechanism
Ajou University
BSD - Sustainable Standards Academy
Center for LCA and Sustainable Design
Center on Sustainable Consumption and Production (CSCP)
China National Institute of Standardization
Committee on Sustainability Assessment (COSA)
Consumers International
DEFRA (UK)
DEKRA
European Commission, DG ENV-C1,
Gesellschaft für Internationale Zusammenarbeit (GIZ)
Global Sustainability Tourism Council
Iniciativa GEMI
Instituto Akatu pelo Consumo Consciente
International Green Purchasing Secretariat
International Institute for Sustainable Development (IISD)
International Standards Organisation (TC207) and Canadian Standards Authority (CSA)
ISEAL
ITC/Intracen (T4SD)
Japan Environmental Management Association for Industry (JEMAI)
Julia Hailes
Karbon Strateji Danismanlik
Keystone Center/ The Green Products Roundtable
Ministère de l'écologie, du développement durable du transport et du logement, France
OECD- Consumer Division
People 4 Earth
Proctor & Gamble

Roland Waardenberg (formaly Ahold)
Shanghai Ecovane Environmental Technology, Inc.
Simapro Software Development India Pvt. Ltd.
Sony
The Green House, South Africa
The Sustainability Consortium
UN Principles for Responsible Investment
UNCTAD/UNFSS
UNDP - Green Commodities Initiative
UNEP Sustainable Procurement (2)
Unilever
United Nations Office for Project Services (UNOPS)
US Environmental Protection Agency (2)
WWF International


TEE
TEEKANNE
Brasilianische Limette
Indischer Chai
Grüner Tee
Meßmer

About the UNEP Division of Technology, Industry and Economics (DTIE)

Set up in 1975, three years after UNEP was created, the Division of Technology, Industry and Economics (DTIE) provides solutions to policy-makers and helps change the business environment by offering platforms for dialogue and co-operation, innovative policy options, pilot projects and creative market mechanisms.

DTIE plays a leading role in three of the seven UNEP strategic priorities: climate change, chemicals and waste, resource efficiency.

DTIE is also actively contributing to the Green Economy Initiative launched by UNEP in 2008. This aims to shift national and world economies on to a new path, in which jobs and output growth are driven by increased investment in green sectors, and by a switch of consumers' preferences towards environmentally friendly goods and services.

Moreover, DTIE is responsible for fulfilling UNEP's mandate as an implementing agency for the Montreal Protocol Multilateral Fund and plays an executing role for a number of UNEP projects financed by the Global Environment Facility.

The Office of the Director, located in Paris, coordinates activities through:

- The International Environmental Technology Centre - IETC (Osaka), which promotes the collection and dissemination of knowledge on Environmentally Sound Technologies with a focus on waste management. The broad objective is to enhance the understanding of converting waste into a resource and thus reduce impacts on human health and the environment (land, water and air).
- Sustainable Lifestyles, Cities and Industry (Paris), which delivers support to the shift to sustainable consumption and production patterns as a core contribution to sustainable development.
- Chemicals (Geneva), which catalyses global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- Energy (Paris and Nairobi), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- OzonAction (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- Economics and Trade (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies. This branch is also charged with producing green economy reports.

DTIE works with many partners (other UN agencies and programmes, international organizations, governments, non-governmental organizations, business, industry, the media and the public) to raise awareness, improve the transfer of knowledge and information, foster technological cooperation and implement international conventions and agreements.

For more information,

www.unep.org/dtie

Unsustainable patterns of consumption and production threaten global development and environmental well-being. Ensuring sustainable consumption and production should take a life cycle approach, and central to this is the development of product sustainability information (PSI).

This publication provides four key recommendations in order to advance a coherent and context-relevant use of PSI that is useful for consumer decision-making:

1. *Provide a global guidance for inter-operability of PSI tools (their development and use), and manage concerns over trade barriers while reducing uncertainty in the information that the tools produce. This can be done under the umbrella of the Consumer Information Programme under the 10 Year Framework of Programmes.*
2. *Encourage major PSI actors, i.e. label and tools associations to use life cycle-based principles as criteria for the alignment of their work.*
3. *Facilitate the inclusion and engagement of representatives of developing and emerging economies in international efforts on PSI.*
4. *Create an international dialogue between brand owners, retailers, consumer organisations and policy-makers in order to acknowledge the different cultures and contexts to develop a better understanding of what consumers will recognise to be information that is credible upon which they can act.*

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