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The ISO 26000 standard as a driver for systemic Design for Sustainability

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Abstract

Sustainable product development is considered a key factor for sustainable development. Products are placed in the interface between production and consumption, therefore the consideration of sustainability criteria early in their development phase, to improve them throughout the life cycle, opens up for innovations that contribute to tackle major sustainability problems in the context of a globalized economy.

Design for sustainability (DfS) is distinguished from ecodesign in terms of sustainability topics covered (not only environmental and economic, but also social) and in terms on the focus on finding new ways to satisfy customers and client needs and make business sense while respecting the physical limits of the planet in providing resources and absorbing pollution.

Given these perspectives and conceptual consensus amongst sustainability experts, efforts have been made to operationalize DfS; some authors have focused on high level models that guide companies in establishing a vision and concepts for (more) sustainable products; other, more instrumental approaches, offer methods and tools dedicated to different phases of typical product development stages.

The state of the art is that tools and methods are available for product innovation including environmental, economic and social criteria; nevertheless, it is recognized that social criteria are still poorly established, except in specific design approaches such as social design, which then overlook the environmental dimension. In other words, full integration in order to find a sustainability optimum, rooted in stakeholder dialogue and validated by life cycle assessment (environmental, social and economic), is far from accomplished. As for more radical sustainable product innovations, despite of the existence of several encouraging and inspiring examples, limitations in methods for sustainability assessment and in the availability of workable design criteria are acknowledged. Another drawback is the lack of coordination between many strategies and practices already used by organizations for tackling environment, quality, health and safety, sustainability communication, reporting and assessment, life cycle management, etc., and product development.

One possible contribution to progress towards a model for sustainable product development on what concerns improved rooting in companies' sustainability management practices, stakeholder engagement and a more robust integration of social aspects, can be derived from social responsibility. Organizational social responsibility has registered a remarkable progress in the last decade, culminating in the development of a comprehensive guidance document for the systematic management of organization's impacts on society and the environment: the ISO 26000 standard on social responsibility from 2010. Although products and life cycle thinking are conceptually part of the activities that organizations following the standard are

supposed to manage in a responsible way, this has not been accomplished yet. Furthermore, the social responsibility cardinal principle of stakeholder engagement is also a window of opportunity for companies to understand stakeholder's and society's expectations regarding their products and find innovative solutions to respond to them.

The development of a framework for DfS building upon previous work in the field of sustainable design management and bringing the novel element of establishing the link to social responsibility principles and practices is a very ambitious task. According to ISO 26000, organizations should address organizational governance, human rights, labour practices, the environment, fair operating practices, consumer issues and community involvement and development in order to reduce their negative impacts and increase their positive impacts on society and the environment. Of course, the implications of products in the context of the system where they are manufactured, transported, used, disposed-off and recycled vis-à-vis all these subjects vary immensely with the product's value chain and characteristics.

Key words: design for sustainability, sustainable development, social responsibility, ISO 26000

1 Introduction

The integration of environmental considerations into product development with the objective of reducing products' environmental impacts along their life cycle (ecodesign, also known as life cycle design, design for the environment or green product development) has been subject of research (for instance, van Hemel, 1998; Myrdal, 2010), tools and methods development (Brezet and van Hemel, 1997; Behrendt et al., 1997; Tischner et al., 2000) and implementation in companies since the 1990's (for instance, Klostermann and Tukker, 1998; Stevels, n.d.).

Key characteristics of ecodesign include the life cycle perspective (i.e. considering the environmental aspects – inputs and outputs – and associated impacts at each life cycle stage, such as climate change, resources depletion, toxicity, air, water and soil pollution, etc.), and early integration (i.e., addressing environmental considerations at the earliest possible stage of product development (Thrane and Eagan, 2007), when there is more room for introducing changes to the product concept and achieve optimum outcomes).

In order to deal with the challenges that underlie the sustainable development concept, companies have to drastically change the way they address product development and its management. The ecodesign concept has evolved to a broader one described as design for sustainability, which includes more radical innovations in the product, questioning its function and thus influencing the existing patterns of consumption which are expected to give a far bigger contribution to sustainable development (Brezet and Rocha, 2001). Unlike in ecodesign, not only environmental concerns are taken into account, but also social and economic ones, in accordance to the so-called “three pillars of sustainable development”.

Some definitions of ecodesign, derived to distinguish it from mainstream design, go beyond incremental gains. However, these definitions were made in the absence of DfS as an additional category (Spangenberg et al., 2010). These authors highlight that DfS broadens the horizon by including long-term and global assessments and challenges established practices around the understanding of the needs and

functionality of the product. By that, it creates an additional level of complexity and makes solutions less clear-cut, and therefore more risky.

Another understanding of DfS comes from the European Commission that in 2009 launched their definition of DfS as a driver of user-centered innovation stating that DfS is the holistic approach to problem solving, allowing for factors that include functionality, ergonomics, usability, accessibility, safety, sustainability, cost, and intangibles such as brand and culture (EU Commission, 2009). In the Wuppertal Institute Designguide the definition of DfS is "...all about establishing or maintaining the individual's quality of life without limiting the potential well-being of other people or future generations...", and with that purpose "...includes the promotion of a sustainable use of environmental space..." and "...needs to provide social-technical solutions that didactically foster appropriate transition processes". Furthermore, the DfS approach in a consistent and comprehensive way needs to consider that (a) "...we are individuals who are organized into social groups and work in organizations that follow certain economic..." and social rationales; and (b) "...needs and desires are satisfied by materialized products and are incorporated into preferences for social justice or meaningful work which are themselves the results of social norms and values (Liedtke et al., 2013).

In their understanding of DfS, Crul and Diehl (2010) point at the need of working with DfS in both systemic and systematic ways including, among other things, consumer needs and the need for sustainability oriented interventions. In the same line of thought, Vezzoli and Manzini (2008) argue that a design approach seeking to effectively tackle radical innovation and sustainable consumption should operate on a system innovation level. They identify two dimensions in a system design approach to sustainability: eco-efficient (product-service) system design and design for social equity and cohesion, and highlight the need to promote and facilitate new configurations (of partnerships and interaction) between different stakeholders to find innovative solutions able to lead to a convergence of economic, environmental and social interests. This calls for the ability to operate or facilitate a participatory design process among entrepreneurs, users, non-governmental organizations, institutions and so on. The agenda of social design is inspired by, among others, Victor Papanek's idea that designers and creative professionals have a responsibility and are able to cause real change in the world through good design. Already in the 1970's he wrote about his ideas for ecologically sound design and designs to serve the poor, the disabled, the elderly and other minority social groups (Papanek, 1971).

Spangenberg et al. (2010 p. 1492) concur to this: *Design for Sustainability must be able to draw on the detailed knowledge of science (and produce its own), but must go beyond it to provide comprehensive solutions by involving actors, stakeholders and consumers in the process. Selective, decontextualised perception of tasks and challenges is not future proofed, as the objects of design cut across all spheres of life and all components of eco-efficiency. Thus design(ers) need a vision of a better life in tomorrow's society and a clear understanding of their role, their possible contribution to and responsibilities in the transition towards sustainable development.*

Building upon the several contributions to understanding the concept of DfS, in this paper the following definition is adopted:

DfS is a holistic design approach to problem solving and to societal well-being that enables to integrate and assess the sustainability dimensions in different stages of the product development process towards the required scale of incremental and/or radical innovations. DfS thus encompasses the dimensions of sustainability performance and stakeholder engagement, and the organizational processes to support them.

When it comes to operationalizing the concept of DfS or sustainable product development, literature is relatively scarce; there are few tools and methods developed to orient the system design process towards socio-ethically sustainable solutions (Vezzoli and Manzini, 2008; Tischner, 2008).

One landmark is the publishing of UNEP's manual "Design for Sustainability – A Step by Step Approach" (Tischner et al., 2009), a joint publication with Delft University of Technology. This manual proposes three approaches: (i) DfS redesign, aiming at incremental product innovation and (ii) new product development and (iii) product-service systems, aiming at radical product innovation. Being a guide, it is very practical and implementation orientated, targeting companies of all sizes and degree of acquaintance with DfS concepts, supported by a theoretical framework and examples of applications. Social aspects are of course included in the manual, but the level of detail in which they are organized and addressed varies in the different approaches and tools it provides. The same happens with stakeholder engagement. The part of the manual dedicated to product-service systems is the one where social aspects are more developed; as for stakeholders involvement, more guidance is provided on the chapter dedicated to user-oriented scenarios.

Byggeth et al. (2007) developed a method for sustainable product development (MSPD) based on backcasting from The Natural Step sustainability principles. It was quite conceptual and overarching. In a further attempt to support moving product categories towards sustainability, Ny et al. (2008) proposed templates that can be used in combination with the method for sustainable product development (MSPD), but these focus on the early stages of product development.

The Natural Step sustainability principles were also the foundation for Waage's work (2007) to propose a roadmap for sustainable product design; by using a model for product development based on four phases (understand the problem/need/desire; explore possible solutions; define and refine the best solution; and implement the solution), this author discussed environmental and social implications in all stages of the product development (therefore going beyond the needs analysis and conceptual design). Here, social aspects concern enforced human rights policies (for both company and suppliers), such as safe and healthy working conditions, freedom of association, non-discrimination in personnel practices and prohibition of forced or child labour, but the relationship of these concerns with product and service development is not clear.

Therefore, the lack of integration of social/ethical aspects in both DfS practice and research is still observed and there are multiple methods and levels of approach that denote the need for a systematic and scientifically grounded work in this field. Similarly, as Tischner observed for PSS development in the above mentioned UNEP Manual (Tischner et al., 2009), it is still missing the multi-stakeholder and -actors approach that is necessary to (re-)design the whole production and consumption systems, as well new forms of co-operation and methods to organize these, which take the different stakeholders' motivations and interest into account and are able to deal with possible conflicts. Her work in the field is one contribution to overcome such gap.

Even if there is no common definition of DfS, the concept of DfS has to be understood from both a performance approach including all aspects of sustainable development and a process approach continuously involving the whole organization, the value chain and the stakeholders as opposed to an ad hoc based integration of DfS issues in design or innovation projects. Design management then becomes a part of DfS as it encompasses the ongoing processes, business decisions, and strategies that enable

innovation by linking design, innovation, technology, management and customers to provide competitive advantage across the triple bottom line: economic, social/cultural, and environmental factors (Design Management Institute, 2014).

Design management is not a standard model to be applied by every organization, and companies work with design management at many levels from a project or function based level to a fully integrated level where design management is a part of the organizational culture (Kootstra, 2009).

Spangenberg et al. (2010) reflect on the ethical point from the DfS perspective stating that “although re-introducing values into science and design (...) contradicts the self-perception and habits of scientific/academic thinking, it brings design closer to end users: moral and ethics are an indispensable element of any social fabric” (p. 1491).

While the existing tools and approaches to DfS point at the need to include both environmental, social and economic issues; to ground decision making on ethical principles; to implement DfS on all organizational levels; to understand DfS as an ongoing dynamic process and to involve stakeholders in this process – none of these approaches seems to cover all the elements.

The publication of the ISO 26000 standard on Social Responsibility in 2010 brought a new framework for addressing the impacts of organizations’ decisions and activities on society and the environment – including innovation for sustainability. ISO 26000 was developed in a 6 year multi-stakeholder and consensus based process involving more than 500 experts from 99 countries and thus offers a systematic and up to date overview of what can be considered as social responsibility with the aim of promoting sustainable development. As the current DfS frameworks and practices overlook social aspects and stakeholder engagement or deal with these aspects based on an ad hoc list of topics, ISO 26000 potentially offers a new and systematic approach. This paper takes a closer look at ISO 26000 with the purpose of analyzing how the standard can contribute to DfS to overcome these gaps.

It is recognised that management system standards like ISO 14001 and ISO 9001 support companies in managing environmental or quality related risks and, to a certain extent, in meeting societal expectations. This is also the case with ISO 26000, but this guidance standard has an even stronger focus on stakeholder engagement, which may open for dynamic innovation processes in the organization.

Even if ISO 26000 is not a management system standard, it provides a management framework for stakeholder engagement as an integrated part of responsible and sustainable business development. As such, ISO 26000 has the potential to move the DfS agenda from a project based to a holistic design for sustainability approach, systematically taking social, environmental and economic considerations into account.

2 The ISO 26000 standard on social responsibility

2.1 Overview

The development of ISO 26000 on social responsibility was triggered by a multitude of previous initiatives in the field of social responsibility or corporate social responsibility, with varied sustainability focuses (often with an unbalanced orientation towards environmental aspects or specific social aspects such as working conditions, human rights or corruption), being targeted to different types of organizations (mostly enterprises, in some cases of large size) and having different objectives (reporting,

management systems, stakeholder engagement, etc.); in this landscape, the concept of social responsibility was (and, for some, is, see for instance Schwarz and Tilling, 2009) losing focus and becoming a buzz-word. There was a need to move forward in terms of conceptual framework and harmonizing terminology, given the fact that organizations are subject to greater scrutiny by their various stakeholders (ISO, 2010).

According to this standard, organizations are urged to adopt a transparent and ethical behaviour that:

- Contributes to sustainable development, including health and welfare of society;
- Takes into account the expectations of stakeholders;
- Is in compliance with applicable law and consistent with international norms of behaviour; and
- Is integrated throughout the organization and practiced in its relationships (i.e., the organization's activities within its sphere of influence).

The essential characteristic of social responsibility is the willingness of an organization to incorporate social and environmental considerations in its decision making and be accountable for the impacts of its decisions and activities on society and the environment.

The principles, practices and core subjects described in the standard form the basis for an organization's practical implementation of social responsibility and its contribution to sustainable development (ISO, 2010). The consistency with international norms of behaviour (derived from customary international law, generally accepted principles, treaties and conventions that are universally – or nearly – recognized) brings an ethical dimension to organization's activities that may not be expressed in the law it is subject to. "Ethical behaviour" is also a fundamental principle of social responsibility in ISO 26000.

Social responsibility applies to the daily operations of an organization and to its strategic decisions regarding new products, services or even business models. Managing social responsibility in line with the standard builds upon many strategies and practices already used by organizations for tackling environment, quality, health and safety, sustainability communication, reporting and assessment, life cycle management, etc.

ISO 26000 proposes that an organization may recognize and manage its social responsibility in an effective way by considering seven core subjects (each of them detailed in different issues, see next chapter):

- Organizational governance;
- Human rights;
- Labour practices;
- The environment;
- Fair operating practices;
- Consumer issues;
- Community involvement and development.

Figure 1 provides an overview of ISO 26000.

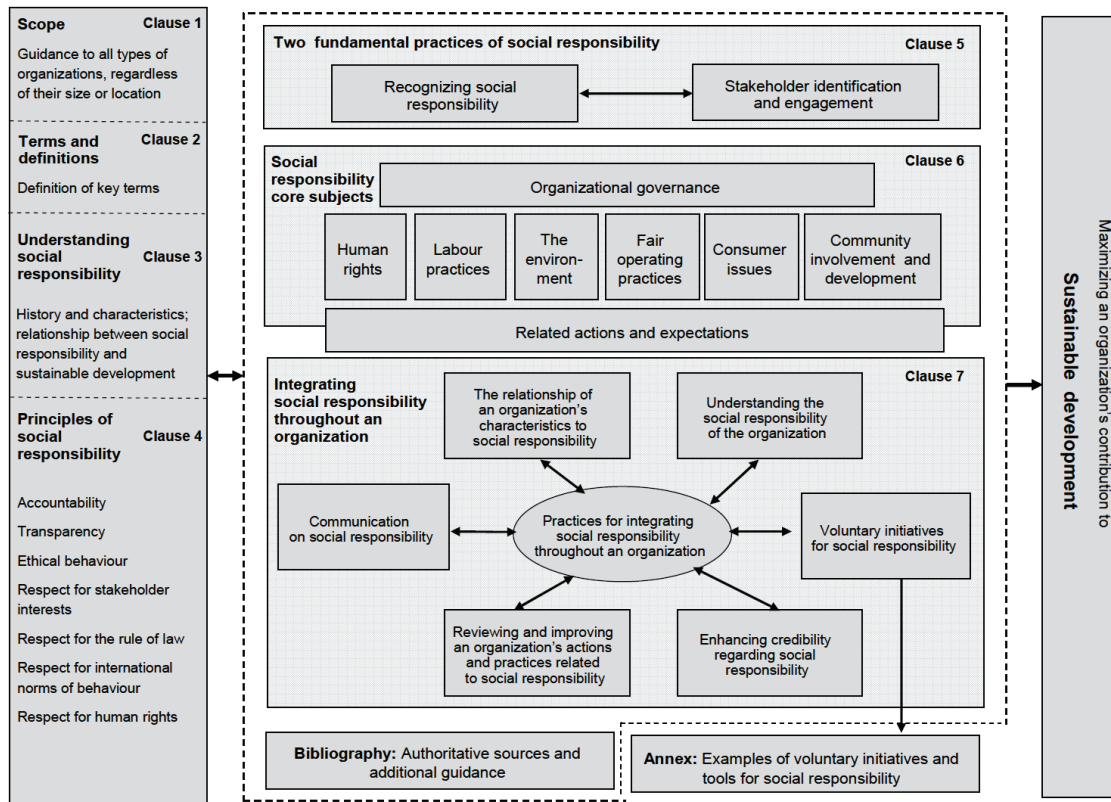


Figure 1 – Schematic overview of ISO 26000

Source: ISO 26000:2010.

The standard provides the following explanation of the figure (ISO, 2010):

- After considering the characteristics of social responsibility and its relationship with sustainable development (Clause 3), the organization should review the principles of social responsibility described in Clause 4. According to the standard, these are fundamental principles the organization according to which the organization, along with the principles specific to each core subject (Clause 6).
- Before analysing the core subjects and issues of social responsibility, as well as each of the related actions and expectations (Clause 6), an organization should consider two fundamental practices of social responsibility: recognizing its social responsibility within its sphere of influence, and identifying and engaging with its stakeholders (Clause 5).
- Once the principles have been understood, and the core subjects and relevant and significant issues of social responsibility have been identified, an organization should seek to integrate social responsibility throughout its decisions and activities following guidance provided in Clause 7.

2.2 Stakeholder engagement in ISO 26000

Identification of- and engagement with- stakeholders are fundamental to social responsibility.

The standard defines stakeholder as “individual or group that has an interest in any decision or activity of an organization” (definition 2.20). It further explains that in this context, ‘interest’ refers to the actual or potential basis of a claim, that is, to demand something that is owed or to demand respect for a right. This may involve financial demands or legal rights, or can simply be the right to be heard. In determining which stakeholder interests to recognize, the organization should consider the lawfulness of those interests, their consistency with international norms and their relationship to sustainable development. This is of major importance because stakeholders’ interests are not always aligned with the broader expectations of society, including – but not limited to – legal compliance. The standard refers to international norms of behavior such as those reflected in the Universal Declaration of Human Rights, the Johannesburg Declaration on Sustainable Development and other instruments.

In other words, the organization should understand and recognize how its decisions and activities impact on society and the environment and understand society's expectations of responsible behavior concerning these impacts. The standard provides guidance to this, primarily by addressing the core subjects and issues. A matter may be relevant to the social responsibility of an organization even if not specifically identified by the stakeholders it consults.

Therefore, organizations are expected to understand the relationship between the stakeholders' interests that are affected by the organization, on the one hand, and the expectations of society on the other.

Understanding how individuals or groups are or can be affected by an organization's decisions and activities will make it possible to identify the interests that establish a relationship with the organization. Therefore, the organization's determination of the impacts of its decisions and activities will facilitate identification of its most important stakeholders. The standard recommends that to identify stakeholders an organization should ask itself the following questions:

- To whom does the organization have legal obligations?
- Who might be positively or negatively affected by the organization's decisions or activities?
- Who is likely to express concerns about the decisions and activities of the organization?
- Who has been involved in the past when similar concerns needed to be addressed?
- Who can help the organization address specific impacts?
- Who can affect the organization's ability to meet its responsibilities?
- Who would be disadvantaged if excluded from the engagement?
- Who in the value chain is affected?

Another key concept in the standard is that of sphere of influence, understood as the “range/extent of political, contractual, economic or other relationships through which an organization has the ability to affect the decisions or activities of individuals or organizations” (definition 2.19). Thus, these ‘individuals or organizations’ “within and beyond the value chain” (ISO, 2010, p.16) can be understood as a subset of the organization’s overall stakeholders towards whom the organization has specific responsibilities. The standard recommends that organizations exercise their influence with others either to enhance positive impacts on sustainable development, or to minimize negative impacts, or both, beyond those impacts organizations are directly responsible for (formally or de facto). This concept is not new; it has been described and practiced in environmental management systems (ISO 14001:2004, paragraph

4.3.1) and Life Cycle Management (UNEP guide on Life Cycle Management, Remmen et al. 2007), for instance.

It follows that engagement with stakeholders and exercising influence in the sphere of influence are two important practices in social responsibility. ISO 26000 addresses them in different ways: while stakeholder engagement concerns activities undertaken to create opportunities for dialogue with stakeholders with the aim of providing an informed basis for the organization's decisions, exercising influence concerns assessing the sphere of influence and determining the organization's responsibilities to promote socially responsible practices in others.

Methods of exercising influence include (ISO, 2010):

- Setting contractual provisions or incentives;
- Public statements by the organization;
- Engaging with the community, political leaders and other stakeholders;
- Making investment decisions;
- Sharing knowledge and information;
- Conducting joint projects;
- Undertaking responsible lobbying and using media relations;
- Promoting good practices; and
- Forming partnerships with sector associations, organizations and others.

In the standard it is recognized that elements of the sphere of influence (concretely suppliers and contractors) can have an impact on the social responsibility of the organization (ISO 2010, p. 71), but in general the emphasis is vice-versa.

Stakeholder engagement is widely addressed in the standard and is of primordial importance in practicing social responsibility, in accordance to the principle of respect for stakeholder interests.

According to ISO 26000, stakeholder engagement can take many forms. It can take place in either informal or formal meetings and can follow a wide variety of formats such as individual meetings, conferences, workshops, public hearings, round-table discussions, advisory committees, regular and structured information and consultation procedures, collective bargaining and web-based forums. Stakeholder engagement should be interactive and is intended to provide opportunities for stakeholders' views to be heard. Its essential feature is that it involves two-way communication.

The purpose of stakeholder engagement in the standard can be summarized as follows:

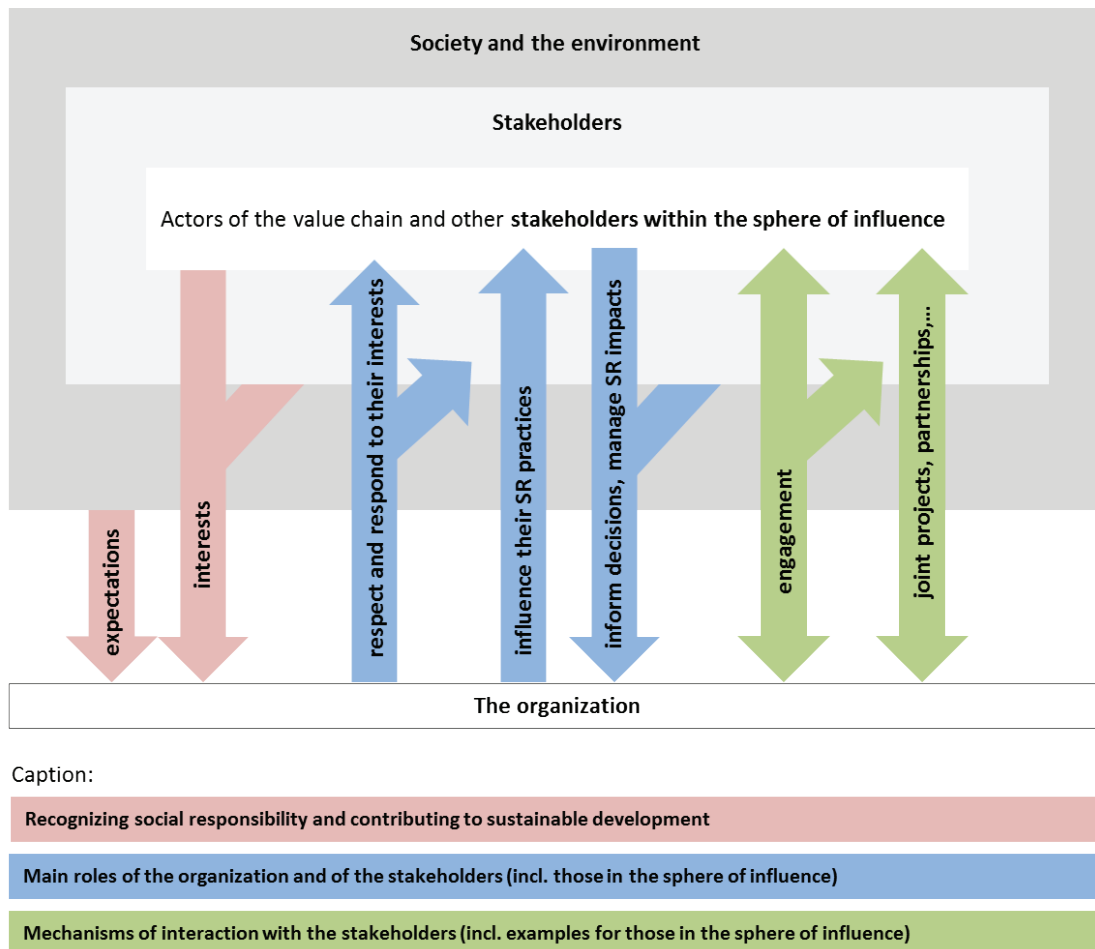
- Recognizing and determining the relevant issues of social responsibility of the organization;
- Assisting the organization in establishing priorities for action on core subjects and issues and translating them into manageable objectives;
- Enhancing the organization's credibility regarding social responsibility, through the verification of its claims and reports, and through resolving disagreements;
- Providing inputs to review and improve performance;

This relates primarily to the stakeholders' role in supporting the organization in managing and continually improving its social responsibility. Furthermore, the standard highlights other uses to stakeholder engagement (ISO, 2010):

- Providing the organization with the benefits of obtaining diverse perspectives;
- Increasing transparency of the organization's decisions and activities;

— Forming partnerships to achieve mutually beneficial objectives.

Figure 2 presents in a schematic manner the main elements described in this section in regards to how the organization relates its stakeholders according to ISO 26000, in the context of the ultimate goal of contributing to sustainable development.



Caption:

Recognizing social responsibility and contributing to sustainable development

Main roles of the organization and of the stakeholders (incl. those in the sphere of influence)

Mechanisms of interaction with the stakeholders (incl. examples for those in the sphere of influence)

Figure 2

An interpretation of the relationships of the organization, the society & environment and the stakeholders (including those within the sphere of influence) according to ISO 26000

3 ISO 26000 as a framework for DfS

3.1 A comprehensive list of social aspects to address in DfS

According to the standard, the seven core subjects mentioned above cover economic, environmental and social impacts that are most likely to occur during business activities, including products, services and processes, and should therefore be addressed by organizations aiming at contributing to sustainable development by minimizing their negative impacts and maximizing their positive ones on society and the environment.

Each core subject includes a range of issues of social responsibility. To be noted that economic aspects are not a separate core issue, but rather dealt with throughout the subjects. As for organizational governance, the standard states that its nature is

somewhat different from the other core subjects, because this subject concerns practices that enable organizations to take action in the other core subjects and to implement the social responsibility principles. In this sense, organizational governance is a “means” to achieve the “ends” (improving performance in relation to the other six core subjects).

The standard calls for a holistic approach – as opposed to a ‘single issue’ approach – to the core subjects and highlights that they are interdependent.

In this chapter, an analysis of the ISO 26000 core subjects and issues is carried out in order to identify those that are in the range of product-service design and against which sustainability performance could be assessed (either with quantitative or qualitative methods). The aim is to produce a comprehensive list of aspects grounded on the robustness of ISO 26000 as argued in the introduction.

The core subject ‘organizational governance’ is excluded from this analysis because it consists of management mechanisms for organizations to make and implement decisions in pursuit of their objectives; governance is very important to support and enable sustainable design management, but it is not a feature of the product or service. It should be noted that, according to ISO 26000, economic aspects are interwoven in the core subjects and issues.

When identifying social aspects that are relevant for DfS, a distinction must be made between (1) those aspects that can be influenced by product/service design and (2) those questions that relate to the choice of suppliers (because this may influence the product/service development process). Moreover, involvement of stakeholders and communities may be regarded as socially responsible in its own right, but this aspect is not included in the assessment of the ISO 26000 issues’ relevance for DfS because it is addressed in the next chapter.

Table 1 gives an overview of the issues in ISO 26000 relevant for DfS and the type of DfS related strategies that are relevant for the issue. The full list of all ISO 26000 issues and their DfS relevance is included in Annex A.

Table 1 – Identification of SR core subjects and issues that are relevant for DfS, and of related design strategies

Core subjects and issues	DfS related practices
Core subject: Human rights	
Issue 5: Discrimination and vulnerable groups	DfS can contribute to fight discrimination e.g. through inclusive design to provide products and services which are accessible to, and useable by, as many people as reasonably possible without the need for special adaptation or specialized design.
Issue 7: Economic, social and cultural rights	Examples of action include adapting goods or services to the purchasing ability of poor people, such as design for the bottom of the pyramid. This may be in the range of DfS, if it fits the company’s market strategy.
Core subject: Labour practices	
Issue 4: Health and safety at work	Avoiding the use of toxic substances and dangerous equipment is within the range of DfS and is closely related to the ecodesign strategy on reducing the environmental impact of production.
Core subject: The Environment	
Issue 1: Prevention of pollution	Prevention of pollution by minimizing emissions, managing waste and handling and disposal of toxic and hazardous substances are recognized as key issues in

	ecodesign and is part of DfS.
Issue 2: Sustainable resource use	Optimizing resource use of energy, water, materials is an integrated part of eco-design and cradle-to-cradle design and should also be included in DfS.
Issue 3: Climate change mitigation and adaptation	Preventing climate changes and, where needed, adapting to climate changes are integrated in eco-design and requires global and local solutions as a part of DfS. Biomimetic design can be used here.
Issue 4: Protection of the environment, biodiversity and restoration of natural habitats	Valuing and protecting biodiversity and ecosystem services, using land and natural resourcing sustainably, and advancing environmentally sound urban and rural development is inside the range of DfS as part of ecodesign, design for biodiversity or cradle2cradle design.
Core subject: Fair operating practices	
Issue 4: Promoting social responsibility in the value chain	Proper documentation and information on sustainability issues in the value chain are within the range of DfS.
Issue 5: Respect for property rights	Respecting property rights are important in any design process and could be dealt with by designers by following codes of ethics for design professionals.
Core subject: Consumer issues	
Issue 1: Fair marketing, factual and unbiased information and fair contractual practices	Responsible marketing and disclosure of life cycle based information like LCA, sLCA, LCC, EPD, ecolabels and other sustainability-related labels to allow consumers to make informed choices is within the range of DfS.
Issue 2: Protecting consumers' health and safety	Design for consumer's health and safety is inside the range of DfS by using the precautionary principle.
Issue 3: Sustainable consumption	Strategies related to increasing product durability; PSS; design for sustainable consumer behavior; responsible marketing, disclosure of life cycle based information; eco-labels and other sustainability-related labels are within the range of DfS.
Issue 4: Consumer service, support, and complaint and dispute resolution	Increased product durability and support for easy repair and maintenance is part of ecodesign and inside the range of DfS.
Issue 5: Consumer data protection and privacy	Gathering of information on any design process is expected to be based on ethical strategies for market studies and analysis.
Issue 6: Access to essential services	Inside the range of DfS if the company's market strategy supports it.
Issue 7: Education and awareness	Inside the range of DfS by disclosure of life cycle based information, eco-labels and other sustainability-related labels.
Core subject: Community involvement and development	
Issue 1: Community involvement	Involving local people in design processes may lead to more sustainable solutions, e.g. in Product-Service Systems.
Issue 2: Education and culture	Supporting the local education and culture, by empowering disadvantaged groups is inside the range of DfS for example by integrating local skills, materials and technologies.
Issue 3: Employment creation and skills development	Through the choice of technologies and partnership with local communities, DfS can support the development of local skills and creation of jobs.
Issue 4: Technology development and access	Through the choice of technology and by integrating traditional knowledge, DfS can assist in addressing this issue.
Issue 5: Wealth and income creation	Integrating local skills, materials and technologies and by giving preference to local suppliers is within the range of DfS.
Issue 6: Health	The design of products or services to help combat health risks like obesity, for instance, by inviting to more physical activities when using the product is a way for a company to promote health and is inside the range of DfS
Issue 7: Social investment	DfS can improve social aspects of community life by

	integrating local skills, materials and technologies, by giving preference to local suppliers and by involving the community in generating ideas for sustainable and responsible solutions.
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Going through the ISO 26000 revealed that the core subjects and many of the issues conceptually are part of DfS and that it was possible to identify design strategies that are already being practiced to address most of the relevant issues.

The use of ISO 26000 opens up for a very broad range of design strategies (when compared to those in ecodesign, for instance) which is positive in the sense that is comprehensive and complete, if one takes the premise that ISO 26000 is a sound basis for integrating societal expectations in DfS. On the other hand, the large range of potential design strategies makes the process very complex and demanding as regards the know how within the design team, the functions involved in the product service development process and the engagement of stakeholders. From a governance perspective, it will also require complex methodologies and supporting procedures to assure improvements in the sustainability performance and a systematic and documented outcome of the design process.

3.2 Stakeholder engagement and DfS

As Driessen and Hillebrand (2013) note, stakeholder theory is largely silent on how information about stakeholders affects new product development. But the practice of collective creativity in design has been around for nearly 40 years, going under the name 'participatory design' (Sanders and Stappers, 2008). Co-design, which was brought to the business community in 2004 by C.K. Prahalad and V. Ramswamy's book "The Future of Competition: Co-creating Unique Value with Customers", differs from participatory design and user-centered design in that it does not assume that any stakeholder a priori is more important than any other (Pelle, 1990).

Co-design refers, for some people, to the collective creativity of collaborating designers. Sanders and Stappers (2008) use co-design in a broader sense to refer to the creativity of designers and people not trained in design working together in the design development process. This is the understanding that matters in this paper in relation to stakeholder engagement in DfS.

Thorpe and Gamman (2011) suggest that equitable arrangements between stakeholders are essential to ensure the successful delivery of design for the social change in the real world and argue that, in this sense, socially *responsive* design is 'good enough', because designers, rather than being *responsible* for societal changes should look to leverage available resources to work *with* social actors to meet societal goals.

A study on integrating multiple stakeholders' issues in 'green' new product development brought light into some important managerial challenges that result from such complex process where conflicting interests arise (Driessen and Hillebrand, 2013):

- Firstly, a distinction needs to be made between market stakeholders (those directly involved in exchanges taking place in the product markets of the organization, such as customers, competitors, suppliers and retailers) and non-market stakeholders (those that are not involved in those exchanges, such as regulators, special interest groups and – to a lesser degree – employees). The study showed that environmental concerns are much more likely to be brought

forward by non-market stakeholders, which leads to tensions or conflicts of interests; these happen also inside a category of stakeholders.

- The process of identifying stakeholders and their issues is important because it will determine the tensions the organization will have to manage. Acknowledging such tensions is a first step towards reaching consensus within the team.
- It is necessary to have coordination mechanisms to keep the 'green' issues in the agenda. Coordination mechanisms range from formal (procedures to include environmental concerns in the innovation process or quantified objectives in a product profile, for example) to informal (that stimulate communication and create a culture where green issues are regularly discussed in new product development meetings). The results showed that using multiple coordination mechanisms in conjunction is important to ensure that a minimum level of coordination issues is safeguarded and no important one is ignored.
- Prioritization principles are necessary and some organizations performed better than others in prioritizing green issues in the decision-making process. New product development projects that address many non-market stakeholders issues use several prioritization principles in conjunction.

Driessen and Hillebrand conclude that stakeholder integration in new product development is a capability which consists of (1) stakeholder issue identification techniques, (2) coordination mechanisms and (3) prioritization principles, and that such capability is developed when the three components are incorporated into the fabric of the organization. This is the result of a learning process which does not happen overnight; furthermore, the features of the organizations matter: those that follow a proactive environmental strategy and are characterized by a high environmental impact are more likely to develop stakeholder issues identification techniques.

The implications of considering all the above when looking at the potential of ISO 26000 to support DfS are manifold:

- ISO 26000 urges organizations to proactively adopt an ethical behaviour and set up social responsibility strategies as a contribution to sustainable development. The standard is in line with the notions of identifying a multitude of stakeholders (and not only the market stakeholders) and of SR issues (regarding which stakeholders have a saying), and the standard explicitly states that all core subjects need to be addressed; this applies to all organizational activities and processes, including new product and service development;
- The purpose of stakeholder engagement includes supporting the organization in defining priorities for action on core subjects and issues and translating them into manageable objectives; no guidance is provided, however, on how to tackle conflicts of interests or wicked problems which is a challenge as the study by Driessen and Hillebrand (2013) pointed out; by extending the scope from environmental management to social responsibility management, this question becomes even more complex;
- The link between the standard and the development of innovations through co-design is less immediate. An adaptation of stakeholder engagement concept, as it is presented in ISO 26000, to the field of design for sustainability would be: to create opportunities for dialogue between in the organization (and specifically the design team) with its stakeholders, with the aim of providing an informed basis for the organization's decisions regarding sustainable product-service development. The stakeholder engagement methods are very broad and if a company wants to pursue co-design, it needs to develop the capabilities,

methods and processes for that. In other words, as seen in figure 2 stakeholder engagement and exercising influence according to ISO 26000 do not emphasize the concept of *working together*, although there are examples of activities in the standard that go beyond dialogue and influence, such as the development of joint projects and partnerships with stakeholders.

- ISO 26000 is silent on what concerns distinguishing the interests of market stakeholders and non-market stakeholders; considering that some market stakeholders such as suppliers, clients and end-users are often in the sphere of influence of the organization, the standard's approach to managing the sphere of influence (i.e., focusing on positively influencing their social responsibility practices) should not distract companies from the opportunities of developing partnerships with them for co-design.

4 Conclusion

From the academic sources it can be concluded that on a general level there are some common understanding of Design for Sustainability, but no common definition. Moreover, the different understandings of DfS specify different aspects to be included on the conceptual as well as on the operational level. In this paper, the following definition of DfS was used: *DfS is a holistic design approach to problem solving and to societal well-being that enables to integrate and assess the sustainability dimensions in different stages of the product development process towards the required scale of incremental and/or radical innovations. DfS thus encompasses the dimensions of sustainability performance and stakeholder engagement, and the organizational processes to support them.*

As the current DfS frameworks and practices overlook social aspects and stakeholder engagement or deal with these aspects based on an ad hoc list of topics, the ISO 26000 standard on Social Responsibility potentially offers a new and systematic approach both as regards the social issues to be included in DfS and in managing the stakeholder engagement.

Going through the ISO 26000 revealed that all the core subjects and 22 of the 37 related issues conceptually are part of DfS and that it was possible to identify a broad range of design strategies that are already being practiced in, for example, ecodesign or in supply chain management to address most of the relevant issues.

ISO 26000 thus seems to offer a rather comprehensive and complete basis for including social issues in DfS. On the other hand, the large range of potential design strategies makes the process very complex and demanding as regards the know-how within the design team, the functions involved in the product service development process and the engagement of stakeholders.

Further research and empirical work is needed in developing knowledge and experiences to comprehensively covering social issues in DfS based on ISO 26000; in literature, the only publication we could find refers to a very preliminary experience with the furniture industry in Portugal (Vicente et al., 2010), in which an expert meeting was organized and the concept was well received by the designers' community, academics and industry representatives.

Stakeholder engagement is established as a fundamental principle in ISO 26000 and it is widely addressed in the standard with primordial importance in practicing social responsibility. As concluded by Driessen and Hillebrand, stakeholder integration in new

product development is a capability which consists of (1) stakeholder issue identification techniques, (2) coordination mechanisms and (3) prioritization principles, and that such capability is developed when the three components are incorporated into the fabric of the organization. In relation to using ISO 26000 as a framework for DfS, it has a number of implications.

ISO 26000 urges organizations to proactively adopt an ethical behaviour and to engage with a multitude of stakeholders as a part of identifying and prioritizing relevant issues. However, no guidance is provided in the standard on how to tackle conflicts of interest among stakeholders or among the organization and its stakeholders, for example related to market priorities versus social enforcement of local communities.

The ISO 26000 standard was not developed with the specific purpose of supporting innovation and design processes. While the standard does encourage stakeholder engagement and gives recommendations on how to structure this process, it does not emphasize the concept of working together, although there are examples of going beyond a stakeholder dialogue by developing joint projects and partnerships. The eventual use of the standard as a framework for DfS is left open for interpretation by the individual organization and its stakeholders.

From a governance perspective, it will require complex methodologies and supporting procedures to assure improvements in the sustainability performance and a systematic and documented outcome of the design process as stakeholder engagement should be closely related to improvements on relevant social and environmental issues to promote sustainable development.

To deal with the growing complexity in DfS, the designers – or project managers in design teams – will need knowledge and competences to bridge the complexity and become facilitators for the changes that designing for sustainability requires. For example, competences related to communication, change management, and relations building while at the same time being able to assess the relevance, validity and usefulness of the inputs for the design process. Such skills and competences are not specified in ISO 26000 and are for the time being not, or very limited, a part of the curriculum for design engineers. Recent projects as the Leonardo da Vinci DEEDS project (Design Education and Sustainability, 2009) developed a number of principles that need to be considered in DfS, among others related to developing skills, creating change agents and learning together.

Another important aspect to be explored is how to balance the use of scientific methods (e.g. Life Cycle Assessments, social Life Cycle Assessments or Life Cycle Costing) with a stakeholder based approach in evaluating the sustainability profile of a product or service.

An on-going project, SInnDesign (Sustainability and Innovation through Design, funded by the Leonardo da Vinci subprogramme of the EU Lifelong Learning Programme) specifically focuses on integrating DfS in the curriculae for design professionals in the habitat cluster and demonstrating how this can be of use in working with selected companies. In this project the linkage between DfS and ISO 26000 is being experimented in order to bring light into the practical application of this approach of DfS in three sectors of the habitat domain: home textiles, furniture and construction materials.

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Annex A

Core subjects and issues	Relevance for DfS
Core subject: Human rights	
Issue 1: Due diligence	This is a process to identify, prevent and address actual or potential human rights impacts resulting from the organization's activities. It's a management process outside the range of DfS.
Issue 2: Human rights risk situations	Organizations should take particular care when dealing with these situations. Outside the range of DfS.
Issue 3: Avoidance of complicity	Actions to avoid complicity include seeking for information about the social and environmental conditions in which purchased goods and services are produced. Outside the range of DfS.
Issue 4: Resolving grievances	This is about remedy having remedy mechanisms to protect human rights. It's a managerial activity outside the range of DfS.
Issue 5: Discrimination and vulnerable groups	Discrimination involves any distinction, exclusion or preference that has the effect of nullifying equality of treatment or opportunity. DfS can contribute to fight discrimination through the provision of products and services which are inclusive.
Issue 6: Civil and political rights	Absolute rights such as the right to life, the right to a life with dignity, the right to freedom from torture, the right to security of person, the right to own property, liberty and integrity of the person, and the right to due process of law and a fair hearing when facing criminal charges. Too vast of an issue to be identified as within DfS range.
Issue 7: Economic, social and cultural rights	Examples of action include adapting goods or services to the purchasing ability of poor people, such as design for the bottom of the pyramid. This may be in the range of DfS, if it fits the company's market strategy.
Issue 8: Fundamental principles and rights at work	This has to do with the relationship between the organization and workers (freedom of association and right to collective bargaining; the elimination of all forms of forced or compulsory labour; the abolition of child labour). Outside the range of DfS.
Core subject: Labour practices	
Issue 1: Employment and employment relationships	This is about freedom of association, collective bargaining, and elimination of forced labour, child labour and discrimination as specified in the ILO conventions. Outside the range of DfS.
Issue 2: Conditions of work and social protection	Includes wages, working time, disciplinary and dismissal practices, maternity protection, welfare matters and access to medical services. Outside the range of DfS.
Issue 3: Social dialogue	This includes negotiation, consultation or exchange of information between governments, employers and workers. Outside the range of DfS.
Issue 4: Health and safety at work	This issue concerns the physical, mental and social well-being of workers and prevention of harm to health caused by working conditions. Design solutions to avoid the use of toxic substances and dangerous equipment is within the range of DfS.
Issue 5: Human development and training in the workplace	This is about expanding human capabilities and functioning enabling people to live healthy lives, be knowledgeable and have a decent standard of living. It also includes access to being creative and productive at work. Outside the range of DfS.
Core subject: The Environment	
Issue 1: Prevention of pollution	Prevention of pollution by minimizing emissions, managing waste and handling and disposal of toxic and hazardous substances are recognized as key issues in ecodesign and is part of DfS.
Issue 2: Sustainable resource use	Optimizing resource use of energy, water, materials is an integrated part of ecodesign and is part of DfS.
Issue 3: Climate change mitigation and	This is about preventing climate changes and, where

adaptation	needed, to adapt to climate changes. The preventive aspects are integrated in ecodesign but require global and local solutions as a part of DfS.
Issue 4: Protection of the environment, biodiversity and restoration of natural habitats	Includes valuing and protecting biodiversity and ecosystem services, using land and natural resourcing sustainably, and advancing environmentally sound urban and rural development. This is inside the range of DfS as part of ecodesign, design for biodiversity or cradle2cradle design.
Core subject: Fair operating practices	
Issue 1: Anti-corruption	Corruption is the abuse of entrusted power for private gain and anti-corruption concerns the way the organization and its relations are managed. Outside the range of DfS.
Issue 2: Responsible political involvement	It concerns the way the organization and its relations are managed. Outside the range of DfS.
Issue 3: Fair competition	It concerns the way the organization and its relations are managed. Outside the range of DfS.
Issue 4: Promoting social responsibility in the value chain	This is about influencing other organizations in the value chain to support social responsibility. Proper documentation and information on sustainability issues are within the range of DfS.
Issue 5: Respect for property rights	Respecting property rights are important in any design process and could be dealt with by designers by following codes of ethics for design professionals.
Core subject: Consumer issues	
Issue 1: Fair marketing, factual and unbiased information and fair contractual practices	This is to allow consumers to make informed choices and to secure fair market practices. It includes responsible marketing and disclosure of life cycle based information like LCA, sLCA, LCC, EPD, ecolabels and other sustainability-related labels. This is inside the range of DfS.
Issue 2: Protecting consumers' health and safety	This involves the provision of products and services that are safe and that do not carry unacceptable risk of harm when used or consumed, both intended and in foreseeable misuse. Design for consumer's health and safety is inside the range of DfS as a precautionary principle.
Issue 3: Sustainable consumption	Is about consuming products and resources at rates consistent with sustainable development. Strategies related to increasing product durability; PSS; design for sustainable consumer behavior; responsible marketing, disclosure of life cycle based information; eco-labels and other sustainability-related labels are within the range of DfS.
Issue 4: Consumer service, support, and complaint and dispute resolution	These are the mechanisms to address the needs of consumers after products and services are bought or provided. Increased product durability and supporting easy repair and maintenance is part of ecodesign and inside the range of DfS.
Issue 5: Consumer data protection and privacy	This is intended to safeguard consumers' rights of privacy by limiting the types of information gathered and the ways in which such information is obtained, used and secured. Gathering of information for any design process should be based on ethical strategies for market studies and analysis.
Issue 6: Access to essential services	Although the state is responsible for ensuring the access to essential services like water, energy, wastewater services and communication, an organization can contribute to the fulfillment of this right through DfS if the company's market strategy supports it.
Issue 7: Education and awareness	These are initiatives to enable consumers to be well informed and aware of how to consume responsibly. This is inside the range of DfS by disclosure of life cycle based information like LCS, sLCA, LCC, EPD, eco-labels and other sustainability-related labels.

Core subject: Community involvement and development	
Issue 1: Community involvement	This is about how the company is involved in the local community for instance by participating in and supporting civil institutions. Involving local people in design processes may lead to more sustainable solutions, e.g. in product-service systems.
Issue 2: Education and culture	This is about supporting the local education and culture, for example by empowering disadvantaged groups. DfS can support the promotion of the community culture by integrating local skills, materials and technologies.
Issue 3: Employment creation and skills development	Through the choice of technologies and partnership with local communities, DfS can support the development of local skills and creation of jobs.
Issue 4: Technology development and access	Access to information and technologies is key to overcoming the disparities that exist between countries, regions, generations, genders etc. Through the choice of technology and by integrating traditional knowledge, DfS can assist in addressing this issue.
Issue 5: Wealth and income creation	Organizations can support the wealth and income creation through DfS by integrating local skills, materials and technologies and by giving preference to local suppliers.
Issue 6: Health	This is about promoting health and preventing health threats and diseases in the local communities. The design of products or services to help combat health risks like obesity, for instance, by inviting to more physical activities when using the product is a way for a company to promote health and is inside the range of DfS
Issue 7: Social investment	Social investment takes place when organizations invest their resources in initiatives and programmes aimed at improving social aspects of community life. DfS can support this by integrating local skills, materials and technologies, by giving preference to local suppliers and by involving the community in generating ideas for sustainable and responsible solutions.