
Analyzing Social LCA approaches through the lens of Strategic Sustainable Development

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Abstract: In recent years several approaches to Social LCA have been proposed. Despite recognized shortcomings of those, recent development has focused more on testing existing approaches and less on finding a unifying framework that can support Social LCA to deliver on its promise: to aid decision making regarding social issues related to product life cycles. This paper offers an analysis and evaluation of the potential contribution of the body of work on Social LCA to sustainable development using the Framework for Strategic Sustainable Development. A number of strengths and weaknesses from a strategic sustainability perspective are identified and recommendations to improve the support for how to deal with social issues in the product innovation process are provided.

Keywords: Social LCA; Social sustainability; Strategic sustainable development; Product innovation.

1. Introduction

Industries are increasingly pressed to consider sustainability aspects when making strategic decisions regarding their products and manufacturing processes. It is still, however, a question of *how* to do this in the most efficient way.

It is well recognized that decisions made during early phases of the product innovation process determine much of the entire life cycle behavior of the product; during its realization, use and end-of life phases (McAloone and Tan, 2005). As a

concrete example, ever increasing expectation on higher performance of products in applications such as aircraft engines, result in the use of new and advanced materials. Such materials come with a set of characteristics, such as an alloy composition that may contain critical substances from a sustainability perspective, or require quite unique manufacturing processes (Sonnemann et al. 2015; Hallstedt et al. 2016). In use, the products need to be maintained, repaired and the degree of recyclability is quite different depending on what design that has been created. The social implications may depend on the material content itself, but typically also on other aspects of the design decisions made. For example, a design requiring the use of aggressive media in manufacturing, impacts the work environment for personnel. Legislation and care for personnel enforce the use of carefully designed work environments that – from a company perspective – may be costly. Material replacements, machinery replacements and upgrades and merely handling of certain materials may be subject to classification and constraints where social aspects become in focus. The above, together with the fact that producer responsibility emerges on all fronts, justifies manufacturing companies to search for better ways to account for social sustainability aspects as early as possible in the product innovation process to avoid the risk of undesired and costly consequences later on. Despite the growing awareness of sustainability issues, and the growing importance of considering social sustainability aspects in the product innovation process, the methodological support for doing so is still immature compared to the support for considering ecological aspects in the development of products (Gmelin & Seuring 2014).

Most of the social sustainability guidance and tools currently available target company-level compliance programs, such as the United Nations Global Compact (UNGC), ISO 26000 (ISO 2010) and the Global Reporting Initiative (GRI 2013). Approaches that focus on products have only recently been developed within the umbrella of Social Life Cycle Assessment (SLCA). Such approaches mirror the more widely known environmental Life Cycle Assessment (LCA). This means that they allow present and potential social impacts of products to be identified from “cradle to grave”, broadening the scope and understanding of a manufacturing company’s contribution to social sustainability/unsustainability. SLCA work has positively advanced the understanding of products’ social impacts, how to identify, qualify and quantify them.

According to Jørgensen et al. (2010), the main functionality of SLCA is to provide decision support, through advice generated by the assessment. And more than just a ‘feel good’ tool, it should be a ‘do good’ tool. However, previous reviews of the literature on SLCA (Jørgensen et al. 2008; Wu et al. 2014) point out a lack of a unifying framework that could allow the further development of the field and turn SLCA into a more robust decision support tool. Examples of areas of divergence amongst approaches include: selection of impact categories, identification of relevant stakeholders, how to measure the social impacts and how to interpret results in a way that supports decision-making. Despite the recognition of the shortcomings, recent development has focused more on testing existing approaches and less on finding a unifying framework that can support Social LCA to deliver on its promise.

The aim of this paper is to analyze and evaluate the potential contribution of the body of work on SLCA to sustainable development, following the suggestion that SLCA should also be a “do good tool”. In order to do so, we chose the Framework for Strategic Sustainable Development (FSSD) as the conceptual lens for our analysis and evaluation (Broman & Robert 2015). The FSSD has proven useful for assessing strengths and weaknesses of several concepts, methods, and tools from a strategic sustainability

perspective (Robèrt et al. 2002; Ny et al. 2006; Byggeth et al. 2007; Bratt et al. 2011; Robèrt et al. 2013; Bratt et al. 2013) and can guide combinations of individual concepts, methods, and tools, making it possible to increase their utility for strategic sustainable development (Broman & Robèrt 2015). Through this analysis and evaluation we therefore seek to strengthen the support in how to deal with social issues in the product innovation process. The research question that guided this work was: *How are SLCA approaches currently contributing to social sustainability and how might these approaches do so in a strategic way?*

2. Methods

This research was conducted in two main steps. Firstly, a literature search was carried out in order to identify the key references for integration of social sustainability into product innovation. The review embraced two main scientific databases (Scopus and Web of Science) and comprised papers mainly on SLCA approaches and applications. Four literature reviews (Jørgensen et al. 2008; Macombe et al. 2013; Wu et al. 2014; Russo Garrido et al. 2016) of SLCA approaches were identified and used as the basis for the subsequent step. The second step consisted of a critical review of the selected references. The critical review used the FSSD as a lens to categorize steps or features of SLCA approaches and to analyze and evaluate the potential contribution of the body of work on SLCA to sustainable development.

The Framework for Strategic Sustainable Development

The FSSD makes use of a five-level structuring and inter-relational model that provides five clearly distinct and interacting levels. This model suggests that it is of utmost importance to first agree upon the system (level 1) that is to be planned within, and only then to go on to define success (level 2) within that system. Once success is defined, strategic guidelines (level 3) can be determined for the selection and prioritization of actions (level 4); all four of these levels can be supported with various concepts, methods, and tools or other forms of support (level 5) (Broman & Robèrt 2015).

- **The system level** describes the overall major functioning of the system, in this case the organization within the human society within the biosphere. The current threats to and degradation of this system are the rationale for the levels that follow.
- **The success level** includes the definition of the vision, which must be bounded by basic sustainability principles. The next level requires this key second level.
- **The strategic guidelines level** specifies the guidelines for how to approach the principle-framed vision strategically, in an economically viable step-by-step approach. The step-wise transition is guided by “backcasting” thinking. Backcasting means imagining success in the future and then looking back to today to assess the present situation through the lens of this success definition, and to explore ways to reach that success (Dreborg 1996).
- **The actions level** comprises everything done in concrete terms and which are scrutinized by the Strategic guidelines at level 3 before being included into a strategic plan.

- **The tools level** includes concepts, methods, and tools and other forms of support that are often required for decision support, monitoring, and disclosures of the actions to ensure they are chosen in line with the strategic guidelines to arrive step-by-step at the defined success in the system.

The sustainability principles of the FSSD (three of them being about the ecological system and five of them being about the social system) are designed for being useful for “backcasting from a principle-framed vision”, acting as boundary conditions for sustainable solutions. Since in SLCA we are interested in the potential contributions of products to social sustainability, we here present only the principles related to the social system. The Social Sustainability Principles (SSPs) of the FSSD are (Missimer et al. 2016):

In a socially sustainable society, people are not subject to structural obstacles¹ to...

1. ...health. (This means that people are not exposed to social conditions that systematically undermine their possibilities to avoid injury and illness; physically, mentally or emotionally; e.g. dangerous working conditions or insufficient rest from work);
2. ...influence. (This means that people are not systematically hindered from participating in shaping the social systems they are part of; e.g. by suppression of free speech or neglect of opinions);
3. ...competence. (This means that people are not systematically hindered from learning and developing competence individually and together; e.g. by obstacles for education or insufficient possibilities for personal development);
4. ...impartiality. (This means that people are not systematically exposed to partial treatment; e.g. by discrimination or unfair selection to job positions);
5. ...meaning-making. (This means that people are not systematically hindered from creating individual meaning and co-creating common meaning; e.g. by suppression of cultural expression or obstacles to co-creation of purposeful conditions).

Structural obstacles refer to social constructions - political, economic and cultural - which are firmly established in society and upheld by those with power. Due to various kinds of dependencies and other factors, such obstacles are difficult or impossible to overcome or avoid for those affected by them (Missimer et al. 2016).

Why the FSSD?

The FSSD brings some advantages that lend themselves favorably as a basis from which to assess SLCA contribution to sustainable development. According to Missimer et al. (2016), its usefulness is due to:

- Its systems approach, which helps prevent situations where a solution to one issue may cause other issues somewhere else or later on in time;
- Its scientific basis of both the natural and the social system;

- Its principle-based definition of success, which allows for a clear definition of the goal of sustainability that is not just based on current trends. Also, because they are phrased as constraints for re-design, the principles allow for creativity and innovation; and
- The ability to make better use of other tools, methods or frameworks for sustainability when necessary.

Also, as pointed out in the introduction, the FSSD has already proven useful for this type of assessment in several previous studies (Robèrt et al. 2002; Ny et al. 2006; Byggeth et al. 2007; Bratt et al. 2011; Robèrt et al. 2013; Bratt et al. 2013).

Analyzing SLCA through the FSSD

A series of questions were developed based on the main features of the FSSD and used to scrutinize SLCA approaches. In an iterative manner, the selected literature reviews of SLCA approaches supported the formulation of answers to the questions. Where needed, additional references were included to provide missing pieces of data. Due to the variety of approaches and low consensus between SLCA scholars and practitioners, some level of generalization was deemed necessary in order to be able to provide answers to some of the questions. These questions, presented in Table 1, are by no means a complete set of questions that could be asked in order to assess a SLCA's contribution to social sustainability, nor were they fully answered by this work. The last two levels (Actions and Tools) were excluded in this analysis as they are more context specific.

Table 1. Guiding questions to identify SLCA's contributions to Strategic Sustainable Development.

<i>FSSD</i>	<i>Questions for SLCA</i>
System	Why was SLCA created? Who should use SLCA and under what circumstances? Does SLCA help users understand more about the system of study and how it relates to society within the biosphere? Does it offer, describe, or measure further information to understand more about the system? Does it state any assumptions at this level? How does the SLCA describe its boundaries to the environment and society globally? When it states or implies assumptions about the system, are those assumptions scientifically agreed upon?
Success	What is SLCA intended/designed for? How well does SLCA deliver what it is intended/designed for? Specifically, are there any 'blind spots' or areas where it cannot help users achieve success in relation to the SSPs? Does SLCA offer or further elaborate on a definition of success, i.e. ultimately a sustainable society? Does this definition cover the full scope of social sustainability according to the SSPs? Specifically, is global sustainability integrated in SLCA's long-term success definition?
Strategic Guidelines	Does SLCA offer any guidelines, processes for planning, or further information for prioritizing strategic actions? If so, how does it integrate sustainability aspects in these guidelines and processes? Can SLCA help users decide whether a potential action is a good choice in light of strategic

prioritization guidelines (i.e. is the action a flexible platform for forthcoming steps that, taken together, are likely to support society's transition towards sustainability and take the organization to the sustainability-framed vision, while striking a good balance between the pace of progress towards the vision and return on investment) and considering urgency, relative contribution, potential magnitude, the precautionary principle, etc.? Does SLCA utilize a backcasting approach, or does it solely rely on forecasting?

3. Results

System

Product systems, as defined in Dreyer et al. (2005), encompass “all the processes involved in the different stages of the product's life from the extraction of raw materials, through manufacture, use and maintenance, to the final disposal of the product” (*ibid*). For a product system, up until recently very few questions have been asked about its dependence and influence on the general regional and global social systems and subsystems like value chains and other stakeholder networks.

One of the identified strengths of current SLCA approaches is that they can clarify how a product system may connect to other social systems and it is proposed that it is the quality of those connections that determines how positive or negative the impacts are on the social system (Benoît et al. 2010). As described by Dreyer et al. (2005), a product’s life cycle is perceived as comprising a number of companies where industrial processes take place (depicted as small blocks in Figure 1 and where sometimes the same company can be responsible for several processes). In turn, the conduct of each of these companies towards their stakeholders determines the impacts of the product on the social system, which supports the idea that, from a sustainability perspective, it is not enough to know what a product is made of to know what kind of impacts may be present throughout its life cycle. Although this is frequently mentioned as “problem” in SLCA literature, from not linking impacts directly to products but to a chain of organizations, we argue that it instead raises a very important question around the nature of impacts and where the responsibility in reducing them lies.

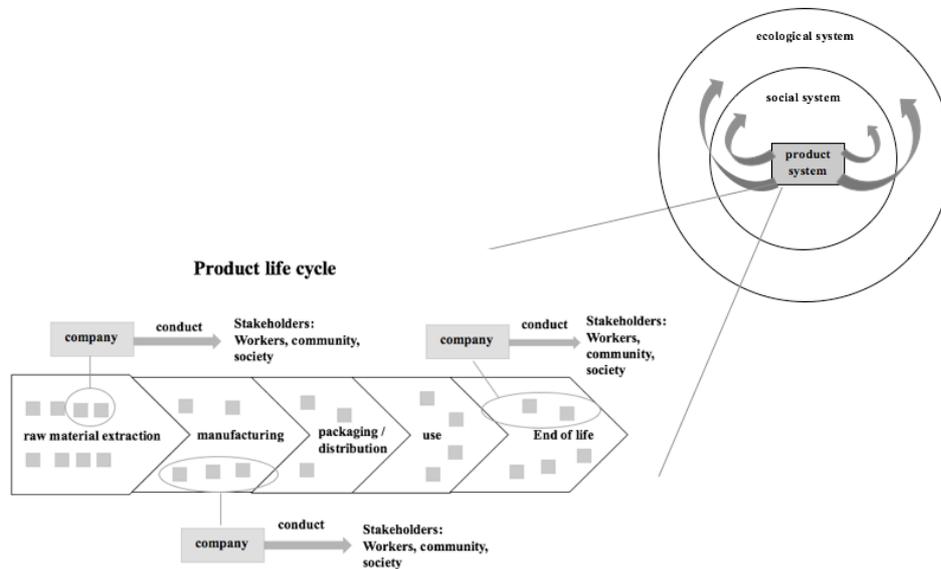


Figure 1. Product system from a nested systems perspective (adapted from Dreyer et al. (2005)).

For the use phase of a product's life cycle it seems, however, that the above mentioned connections with other social systems cannot be established the same way. To which company would we attribute processes to? Although "consumers" are one of the pre-determined stakeholder groups that may be affected in a product system, other impacts on society at large may also arise by unintended (or intended) product use, e.g. cyber bullying in social media applications. A majority of SLCA studies have not included the use phase of a product (Chhipi-Shrestha et al. 2014), indicating that an important part of the connections to the wider social system still needs to be clarified and addressed for SLCA to better contribute to sustainable development.

Current SLCA approaches have contributed to the understanding of how a product interacts with the social system by proposing a categorization system of stakeholder groups and respective impact categories. Here we refer only to Type I characterization model which comprises the majority of the SLCA approaches and application cases thus far. This categorization has provided visibility around who is being affected and awareness in companies by noting that a product's social impact cannot be quantified only by looking at how safe the manufacturing processes are. The ways that these stakeholder groups might be affected, however, remains unclear.

People can belong to different stakeholder groups simultaneously, so categorizing potential impacts from such starting point raises two challenges. First, it is difficult to determine how people may be affected. Workers may be treated fairly by a company while the same company engages in tax evasion. The latter affects the worker as she, as a member of society, gets lower quality public services. Second, if an SLCA chooses to focus on selected stakeholder groups, for instance, workers, a product assessment may show partial and distorted results for this very same reason. And companies may end up focusing solely on what is convenient to them.

Additionally, current impact categories do not represent points further along the impact pathway (Russo Garrido et al. 2016), as they are merely logical groupings of

SLCA results, related to social issues of interest to stakeholders and decision makers. If SLCA puts forward Human Wellbeing and Dignity as Areas of Protection (AoP) (Dreyer et al. 2005) what are then the basic conditions for the maintenance of human wellbeing and dignity and how are we currently undermining them? That said, there is an opportunity here to improve characterization models by further exploring how these groupings relate to the resilience of the social system.

Success

As mentioned in the introduction, the main functionality of SLCA is to provide decision support through advice generated by the assessment. And more than just a “feel good” tool, it should be a “do good” tool (Jørgensen et al. 2010). It should in fact lead to an improvement of the social impacts it assesses. So how does SLCA create the conditions for achieving success?

First of all, SLCA provides in its “Methodological Sheets” (UNEP-SETAC 2013) a very thorough compilation of subcategories and related indicators that gives substance to the concept of social sustainability. In order to evaluate the coverage of subcategories in relation to social sustainability, we have mapped all of them (including the indicators) against the SSPs of the FSSD presented in the methods section.

As a first result it can be stated that all subcategories can be mapped to the SSPs, implying that overall SLCA seems to contribute to social sustainability, as SLCA users are asked to consider all of those aspects. However, it seems that the attempt at comprehensiveness has also led to overlap and thus confusion as well as cumbersome in working with the methodological sheets. The inventory indicators cover often times a mix of performance aspects of organizations and governments and the effects caused by performances. For example, in the stakeholder group *community*, issue *community engagement*, the inventory indicator “Transparency of Government Policymaking” refers to how a government conducts its processes, whereas the indicator “Public Trust of Politicians” can be considered an effect of the level of performance of the first. Also, the great amount of indicators can be seen as a valuable resource, where SLCA users can pick and choose indicators. However, it can also be seen as an obstacle by users as there is no guidance of how to select them.

We believe that the simple mapping of the subcategories and indicators to SSPs already adds value to the further development of SLCA because it sheds light onto the impact pathways, pointed out as missing in the previous SLCA reviews. As the SSPs are derived from an understanding of the mechanisms through which we undermine the social system (Missimer 2016), connecting them to indicators could allow us to better identify the links between “social performance” (the conduct of a company), “social effect” (the social phenomenon caused by that conduct) and “social impact” (the consequence of that conduct that is felt by people directly in life) (Macombe et al. 2013).

Nonetheless, just knowing that things are good or bad does not automatically provide us with insights on how to make things better, especially when there is no agreement on what the ideal looks like. Chhipi-Shrestha et al. (2015) point out that the variety of scoring systems proposed by different applications of impact assessment indicates the lack of a common, well accepted system. Many of the current approaches (Wu et al. 2014; Russo Garrido et al. 2016) make use of Performance Reference Points (PRP) to evaluate aspects that require improvement. The PRPs allow the evaluation of the position of the unit process to be assessed relative to the performance expected from an

international convention, a Social Responsibility best practice guideline or even when compared to other countries (Russo Garrido et al. 2016), but by no means determine if it is enough to achieve social sustainability.

Missimer et al. (2014), when analyzing the ISO 26000 Standards, found a similar challenge and concluded that reliance on goals that are set by what is presently perceived as established norms is risky because there is no way to know if what society expects today is also what society will expect tomorrow. Also that there is no guarantee that the expectations are in any way aligned with what is needed for social sustainability.

This raises the question if finding a perfect scoring system is in fact needed in order to fulfill the claimed ultimate goal of SLCA, which is to improve the wellbeing of stakeholders over a product's life-cycle. The identification of potential violations to human wellbeing should raise enough awareness that action is needed. A second benefit then from this initial mapping against the SSPs is to challenge the notion of PRPs as the ultimate goals to be met. According to Missimer et al. (2016), the definition of sustainability is not about flourishing of human life (or all people having top wellbeing all the time), but about the basic conditions that are necessary for the social system to not systematically degrade, so that the opportunity to meet needs remains. In this sense, the SSPs can keep providing the creative tension necessary for structural obstacles to human wellbeing and dignity to be removed, and consequently create the conditions for the wellbeing of stakeholders over a product's life-cycle to be improved.

Another aspect worth mentioning is who the user of SLCA is and whose decisions it should provide support to. Jørgensen et al. (2009) discuss the feasibility of SLCA from a company perspective and conclude that the current methodological challenges (lack of reliable data and well agreed weighing system), together with being quite resource intensive, make the usability of SLCA not self-evident.

Strategic Guidelines

Considering that success for SLCA is to provide decision support through advice generated by the assessment, it seems like too much attention has been given to the assessment part and too little attention to the generation of advice in order to support decisions. It is as if we could assume that the results of the impact assessment would automatically lead to improvements in the product life cycle, just by allowing decision makers to choose the alternative among several which leads to the most beneficial social impacts (Jørgensen 2013).

When thinking about how to address social sustainability problems a great challenge is the type of action to take. Avoiding countries or, more seriously, ending operations in the countries that score badly on a Social Hotspot Assessment, for instance, might improve the picture of that particular assessed product but does not necessarily lead to social sustainability in those countries. A company moving operations out of a country may contribute to a lack of basic economic means for survival and therefore a contribution to structural obstacles to health. The unavailability or inaccuracy of data in current SLCA approaches may mean that the only way to address social sustainability in the supply chain is to be proactive and try to influence it, rather than trying to measure and compare social impacts. Implications of trying to address negative social impact by moving operations is commonly discussed in the field of Sustainable Production and Consumption (Parent et al. 2013).

According to the UNEP/Setac Guidelines, in the Interpretation phase of SLCA significant issues should be identified and recommendations should be made. There is however very limited guidance on how to evaluate significance, how to prioritize among issues or how to provide recommendations that will support decision makers in taking actions that will ultimately lead to social sustainability. The literature reviews analyzed for this paper did not cover this step of SLCA.

The use of Performance Reference Points could in a sense be interpreted as guidance for action. Parent et al. (2013) state that “if organizations are to improve stakeholders’ social conditions, a first course of action is to behave according to this set of prescribed principles” (*ibid*) (i.e. performance reference points). Although in many cases trying to reach those norms might improve social conditions, there is no guarantee that other problems are not also being created (Jørgensen et al. 2012). Schwartz and Tilling (2009) discuss that standards and international conventions (on which the PRPs are based) are usually what stakeholders can agree on and what some might call the lowest common denominator. They also point to the risk of companies ending relying on external standards and avoiding to make own decisions on necessary actions. We argue that this approach not only limits creativity but also risk organizations finding themselves always trying to “catch up” with the latest trend.

4. Discussion and Future Work

In order to make strategic decisions towards social sustainability (and sustainability in general), assessments need to be based on a robust, scientific understanding of the systems humanity depends on for survival, and sustainability goals that are derived from this understanding. The lack of consensus around relevant social issues, impact categories and stakeholder groups in current SLCA approaches reveals the need of a wider discussion and definition of what social sustainability means. Also, in order to clarify social impacts, there is a need to identify in what ways society may erode the social system, directly or indirectly. Additionally, the focus on existing issues may prevent SLCA users to foresee and prevent future problems. So instead of applying a problem-oriented approach to planning, where social impacts are dealt with one by one as they appear in the system, it should be possible and desirable to plan ahead with the ultimate objective of social sustainability in mind.

In terms of decision support, SLCA currently lacks robustness: results from SLCA, usually performed by scientists to evaluate a scientific question, may be too complex to interpret from a business standpoint; the impact perspective may be too narrow, missing other aspects of social sustainability; and current approaches generally lack a strategic business perspective. Assessment is also only one of the elements in making decisions, and reliance on assessments that may have been too narrowly scoped in order to make a decision may lead organizations to also narrow thinking and lacking of a strategic perspective.

Similarly to previous work on Environmental LCA (Ny et al. 2006) and the ISO 26000 (Missimer et al. 2014), we argue that assessments should start with an overview of the whole system, allowing all issues that are found to be in conflict with basic social sustainability principles to be taken into account. The SSPs of the FSSD are few and allow each organization to assess their products, processes and conducts for themselves in how they might be contributing to violations now and what issues could come up in the

future, and only then undergo detailed studies on specific impacts and SLCA can greatly support this subsequent step. This approach also facilitates to quickly scan for potential trade-offs and avoid shifting problems around. This requires SLCAs to include a perspective that is large enough in time and space (not only what the organization can control or directly influence).

The FSSD in that sense is a mental model that guides users in a strict but yet not prescriptive way on how they may or may not be contributing to sustainable development. It helps organizations to create long-term strategies to innovate, plan, act and monitor long-term in a way that is cohesively aligned with sustainability.

We believe that the above recommendations can support a diversification and democratization in the application of SCLA thinking as it would allow organizations themselves to make use of such an approach, instead of being in the hands of experts. Expert knowledge would be invited in whenever opportunities for improvement were too difficult to see. In a sense, the present work also benefits non-experts interested in gaining a better understanding of social implications of a product of product through its whole life cycle and could allow different users to apply high-level thinking around social sustainability issues without extensive specialist training.

Implications for the industry are to recognize (a) the imperfections with analyzing product's lifecycles with respect to social sustainability and (b) that mitigating the risk of an unsustainable supply chain is unlikely to occur through simply selecting countries based on their 'social sustainability score', but rather requires making design decisions early in the product innovation process and actively seeking to improve social conditions in the supply chain.

Implications for the research community are (1) to further develop impact pathways having the SSPs as a basis, (2) conduct future research on how to design support that integrates social sustainability considerations in different instances of decision-making such that the support is compatible with users' needs and learningful, allowing for future decisions that lead to more sustainable solutions.

Acknowledgements

Financial support from the Knowledge Foundation and the Futura Foundation in Sweden is gratefully acknowledged.

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