Letters to the Editor

The Value Debate: Ecodesign in a Global Context

Are there differences in global values and do they matter?

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Schmidt and Sullivan* [1] raise the important question: can "...global organizations ... derive design recommendations based on (generic) LCA weighting systems"? I would like to state upfront that I do not know the answer to the question, nor do I advocate one generic weighting set that should be used by everybody, although my colleagues and I made one proposal on how to deal with the problem [9]. I agree with the authors' opinion that "...just using several weighting methods, without reflecting the value choices and checking what fits best with [the decision makers'] values [...] cannot be recommended...".

I am writing this commentary because after reading the Schmidt and Sullivan article, I am excited, hopeful, and confused at the same time. I am excited because the question is academically interesting and of practical relevance, and because it is raised by two problem owners from a global player that maintains one of the larger LCA groups world-wide. I am hopeful because these two authors appear to have access to even more useful information than is included in this article, that may be used to help the LCA community answer some of the questions I raise later in this letter.

The authors state that the "...regional variations in legislation, consumer values, monetary valuation, existing weighting sets and expert opinions... [suggest that] ...no globally agreed upon weighting set is likely to be derived" and conclude, "For any external communication, none of the quantitative weighting sets can be used." This is where I get confused. How does the first statement justify this conclusion? The authors show regional variation by referencing surveys that show different nations' public awareness of environmental issues, different levels of investments by selected nations, and variation in weighting sets between different geographic areas or polled groups. This variation originates from at least three sources:

(i) variation in actual magnitude of the environmental problems, e.g., water resource problems in Spain versus acidification in Sweden;
(ii) degree of knowledge among the polled subjects including recent history of coverage in mass media; and
(iii) differences in values, e.g., differences on how impacts on humans are valued compared to impacts on biodiversity, or how future impacts should be compared to present impacts.

Variation due to (i) and (ii) do not automatically justify variation in weighting sets because differences in effects can be accounted for by the impact assessment models and differences in knowledge should probably not be allowed to affect the weights. Therefore, only if the differences in values (iii) cover the lion's share of variation, would the authors' claim be supported that "...no globally agreed upon weighting set is likely to be derived." There are many published examples of surveys which did not control for (i) and (ii). I also believe that surveys performed for weighting in LCA or for prioritizing environmental problems in environmental policy are likely to be artifacts of incomplete preferences rather than the true elicitation of preferences [2–5]. So, I do not believe that the results presented by Schmidt and Sullivan justify their conclusion. However, they may be used to discourage the use of the presented weighting sets.

It would be especially interesting to know more about the authors' own survey. How did they make sure that all surveyed persons referred to the same magnitude of effect? If the Swedish respondents weighted the importance of a year of water use in Sweden and the Spanish respondent the same for Spain, there is no reason to assume that they gave the same importance to the problem even if they hold exactly the same values on the issue. Experiences with such surveys suggest that it is extremely difficult to make sure that all respondents have the same magnitude of effects in mind when they state their importance. Also, knowledge about the effects confound the results to an extent that the resulting weighting sets do not reflect difference in values but artifacts. Even if the survey question states clearly which area and time span of emissions and which area and time span of impacts should be considered (most surveys do not), respondents may still have in mind their own reference systems or be unable to make proper mental transformations[2].

Schmidt and Sullivan also argue that endpoint approaches should not be used because they use conjecture rather than validated science and because they provide information on a level that is not helpful for designers. Any discussion on what is needed in terms of evidence to show that a relationship moves from a conjecture to validated science would indeed find a lot of variation in opinions on this question [7,8]. The cited model [6] to predict the number of additional malaria cases due to climate change is one of the models used by IPCC – the same organization that uses GWP models. I admit, the uncertainty range is much larger for such estimates because predictions of temperature, humidity, population and resistance changes need to be combined, and assumptions on medical support and progress in the global community are necessary. However, who

* The reply by Schmidt and Sullivan will appear in the May issue of Int J LCA.

[1] All opinions are mine and not necessarily shared by the organizations mentioned above.

[2] Areas and time spans vary often by orders of magnitude while averaged weighting factors vary by a factor of four and less.

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is more likely to model these changes: a large group of domain experts contributing scientific findings from their disciplines or senior management/designers deciding in a matter of minutes based on a guess or back-of-the-envelope calculation? While the "lack of science" argument is a familiar argument, I was more confused by the statement that designers would know better how to reduce 40 tons of greenhouse gas emissions than 6×10^{-6} fatality cases due to the same greenhouse gas emissions. So far I assumed that designer support tools need to be much more specific and on a process level. I would guess that eco-designers at Ford need to know the environmental trade-offs between component weight (due to the fuel-use implication in the use phase) and supply-chain impacts of different metal and plastic materials, their (surface) treatments, and downstream impacts. If this guess is true, then designers need information that includes trade-offs between different environmental problems unless you want them to find Pareto optimal solutions in 10 to 15 criteria systems (impact categories). These trade-offs need to be at least semi-quantitative to be practical in operational decision making, and we have shown that endpoint modeling may support such a process significantly [9]. I also believe that confronting decision makers with endpoint indicators allows them better to make value judgments that are not confounded by biases through magnitude and knowledge effects.

Summarizing Schmidt and Sullivan's final paragraph, I assume that their advice is that senior management of global organizations should perform internal grouping and/or qualitative weighting that consider the organizations' values and visions, and the circumstances of the market being considered. I would like to see this as the starting point of a paper aimed at solving among others[3] the following questions:

- Among what type of environmental information is senior management able to make trade-offs (stressor level, impact potential level, effect level, or damage level)?
- Once corrected for differences in temporal and spatial extension, variation in geographical magnitude, and knowledge about the issues, what are the remaining value-related differences between individuals within the same and of different cultures?
- How do global organizations deal with intercultural differences in decision making? What can we learn?
- How will Ford eco-design a car differently for the U.S., Europe, or China because of different cultures?
- How can the exchange between designers and senior management be facilitated for operational decision making?

In the domain of LCA, several researchers [7–15] have started to deal with these questions. Experiences with the Kyoto protocol and the recent months of international policy prove that we are not the only ones who struggle with the question of global values. Among the questions that need to be resolved is how to add up fatality risks in the industrialized world with fatality risks in developing countries and how to account for future fatality risks? Daily decisions by global organizations and also by each consumer make these trade-offs implicitly. By making them explicit, we may foster public debate that lags far behind market realities. Much remains to be done and I believe that contributions of global organizations like Ford are not just useful but necessary. In this spirit, I await further fruitful contributions and concrete suggestions on how to deal with the questions above.

[3] A more comprehensive open list of questions that need to be answered to improve interpretation of LCA results can be found in [16].

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