Editorial

The ISO 14040 Family

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Four international standards and a technical report are the impressive result of seven years of intense effort of dedicated and competent experts in the area of Life Cycle Assessments.

The subcommittee SC 5 on Life Cycle Assessment with its numerous teams served as a platform, and is itself a part of the ISO Technical Committee TC 207 on Environmental Management. In November 1993, with an initial meeting in Paris, the start signal for standardization was finally sounded.

At this point in time, it was still uncertain which ways were to be embarked upon and which goals might be achieved. Of course, the 'game rules' concerning the importance to be attributed to ecobalances were recognized at an early date. On the other hand, skepticism was observed regarding to whether or not the prompt establishment of such regulations would result in unnecessary restrictions to an instrument of evaluation still seen to be in continuing development.

So emerged, the central challenge of the standardization project: International standards on Life Cycle Assessment are only significant if they make the necessary practical instructions without extending into regulations which may be far too detailed. In other words, a balance must be achieved between the unavoidable establishment and the possibility of interpreting these regulations more or less freely.

Consequently, the first working phase of the subcommittee, which stretched still the final publication of standard 14040 in June 1997 (Environmental Management – Life Cycle Assessment – Principles and Framework) concentrated on the conceptual formation of these standards.

ISO 14040, first of all, is a gentle introduction into the subject matter, and more or less defines the framework for the field of Life Cycle Assessment rather than establishing ambitions regarding a precise methodology. It should not be forgotten that thoroughly new ground had to be broken: since Life Cycle Assessment was already highly defined by the SETAC, which was first concerned with open scientific discussions, but then went on to the world of standardization. This exact definition tolerated no ambiguities, serving as a guiding principle and pursuing an ingenious system with different degrees of conformity (shall, should, may).

ISO 14040 is finally an excellent compromise between that which makes up a Life Cycle Assessment and that which is to be achieved at all.

This unification process, however, did not by any means proceed without conflicts. One will always to remember the struggle involving the third specialized building block of Life Cycle Assessments, the interpretation, originally being known under the term 'improvement' at the beginning of these discussions.

An argument for the altered viewpoint was derived from the complete works of the TC 207. These were naturally also oriented with the motto of improvement. Furthermore, it has also been noted that a Life Cycle Assessment can also include further applications, as is illustrated in the central diagram on 'Components of an Ecobalance' in ISO 14040 also.

This standardization consequently demarcates a framework which has been chosen with consideration; moving within this framework, however, points of evaluation may not be neglected. Aspects like the establishment of goals and the framework of a study, as well as information concerning the target groups, must be emphasized and accentuated continuously. The results of a Life Cycle Assessment study consequently include all of this data.

The concept of a critical evaluation observed in the ISO 14040 is uniquely and clearly differentiated from the numerous standardization projects of the TC 207. Originally already developed in the legendary 'Code of Practice' by SETAC, this approach has been set down in the final chapter of the standardization. The significance of the critical evaluation stems from its double role; with this critical evaluation, an attempt is made to accompany a study both professionally and critically, and to adjust the findings in conformance with the standardization.

The critical evaluation, however, also considers the question of how it is possible to carry out studies with comparative information while regarding the aspects of both fairness and transparency.

Here, particularly demanding requirements must be fulfilled, which include investigations by independent experts or even by interested parties, to evaluate the appropriateness and admissibility without thereby replacing the responsibilities of the client for their study.

Without any doubt, this also entails a mandatory portion of openness and frankness, as well as participation, which distinguishes the modern concepts of evaluation that are also striven for in Life Cycle Assessment.

Parallel to finding a consensus for standard ISO 14040, the activities for the development of standards for the different LCA building blocks also proceeded continually.

The experts considered the balance of materials quite energetically since this topic has always been well known for defining the practice of Life Cycle Assessment. The standard

ISO 14041, however, not only takes the methodical aspects of material balance into account, but once again considers the chapters of ISO 14040 addressing the establishment of goals and the framework of evaluations in depth. As a result, it is therefore labeled twofold with the term Environmental Management which includes Life Cycle Assessment as well as the Goal and Scope Definition and Life Cycle Inventory. Further essential points of the standard are the multi-layered aspects of data generation and data processing as well as suggestions for how one should consider the ever-active field of 'allocation'.

It could be seen, however, that the topic of material balance still offered further points for an initiation of standardization procedures. Especially important was the desire to accompany the condensed and partially abstract form of presenting results with the help of comprehensional aids.

This formed the grounds for technical report ISO/TR 14049 on Environmental Management – Life Cycle Assessment – Examples of Application of ISO 14041 to Goal and Scope Definition and Inventory Analysis, which has subsequently been published.

The emphasis lies on the term 'Examples', in order to exclude any misunderstanding from the start that it might indeed deal with further obligatory definitions. In contrast, these examples, which have been selected from a wealth of suggestions and have been carefully prepared, should also serve to support a better understanding of ISO 14041.

In spite of this knowledge, the projects on material balance have not yet been conclusive; a document is presently being prepared which is dedicated to the exchange of data concerned with material balance and has been recorded as ISO 14048.

From the seven years mentioned initially, a further seven years were required until the project on Life Cycle Impact Assessment was presented as a suggestion. With an overwhelming majority in the final voting procedure it was raised to become ISO 14042.

ISO 14042 is a masterly achievement of the experts involved in its design, although the challenge did not stand in a focal point but rather the concept of bringing the world of technical systems with the language and the ideas of the ecological systems into a combined system.

Whereas the technical systems are easily described and quantitatively ascertainable in spite of all limitations, the estimation of effects must make use of model observations as resources for understanding these complex phenomena.

It was consequently necessary to establish relationships between the dimensions of describing the material balance, and the parameters for measurement and making estimations. The manner in which these innovative considerations had been chosen and how the methodical estimation of the effects could be established, is to be seen with the performance of ISO 14042.

The estimation of effects, however, is always related to something enigmatic: the passage to be taken from an estimation of effects to the establishment of values may be short, but it must nevertheless be embarked upon in reality.

Especially this gray zone had to be covered by the standard since the evasion of this field of conflict would have otherwise provoked considerable uncertainty with regard to its competence and credibility.

The standard handles this complex problem very cleverly; first of all, the most important possibilities for processing the indicated results are addressed with the aid of an estimation of effects, whereby the methods described only represent optional components.

A well-founded 'stop signal' is then set when the weighted procedure is used for the publication of specific comparative information, especially since this weighting depends on individual considerations to a particular degree and not on any knowledge of the natural sciences.

Nevertheless, the leeway which is given is still sufficient in order to undertake the procedures noted above by way of a simple listing of the results to the indicators of the effects.

However, since this leeway is not totally free, and cannot be free from individual considerations, a degree of fairness must be maintained in the report on the estimation of effects in order to lay this fully open.

Thus, the standard of the true calculation sets down limits where the individual considerations entirely cover the view of scientific results. At the same time, the chance remains to discuss a feature which must be considered to be significant for a study.

What would a Life Cycle Assessment be, however, without taking into consideration that which has been derived as the actual result of a study? It must not be forgotten that the methodical processing must always keep the goals of a study and the stages which are to be embarked upon in mind in order to reach these results.

Consequently, the full concept of the ISO 14040 family is based on a working segment which concentrates on these points as if there would be:

- A derivation of conclusions,
- explanations of restraints,
- expression of recommendations and
- transparent reports to the results of evaluation.

Standard ISO 14043 on Environment Management – Life Cycle Assessment – Life Cycle Interpretation provides the necessary explanations for these subjects. ISO 14043 symbolizes the roof of the Life Cycle Assessment architecture, which is made up of a foundation (ISO 14040), two methodical building blocks standing as a support to this roof (ISO 14041 and ISO 14042), and precisely this integrative element which covers the entire procedure, ISO 14043.

With the existing ISO 14040 family, hope naturally exists at the moment that the mandatory rules of the game, have been established such that the instrument of evaluation, i.e. Life Cycle Assessment, is more than even involved in the interesting and shifting problems and questions at the interface between economy and ecology. In this way, it is also able to arrive at innovative insights and to furnish new inspirations.

The work of many individuals have gone into the standards of ISO 14040 and the subsequent standards. These people alone are responsible for this success and our grateful thanks must be expressed to them alone: The ISO 14040-standards are therefore a people standard.