Technical Report
on
Trends Analysis Workshop
Life Cycle Assessment and Product Data Technology

The use of Industrial Standards

for the exchange, the storing, the management and the quality control of

environmental data

Edited by Anna Moreno,

ENEA the 22nd of October 2005

This report has been prepared with the contribution of all the participants of the Trends analysis workshop organized by CENSTAR with the collaboration of ENEA (National Agency for New Technologies, Energy and Environment) and VAMAS (Versailles project on Advanced Materials and Standards) held at Vico Equense (Italy) the 15-16 September 2005.

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1. Objective

The main objective of this report is to provide the information necessary to further disseminate the results of the CENSTAR trends analysis workshop on Life Cycle Assessment and Product Data Technology. All the presentations made during the workshop are available through the "net seminar" ENEA web site (HTTP://197.107.71.126/alfa_netseminar/index.htm). You need to register in order to view them but access is free.

2. Background information

The project CASCADE (www.pdt.enea.it), funded by the European Community under the 'Competitive and Sustainable Growth' Programme, has given results which can be of great benefit to everybody. The Reference Data Library (**RDL**) and the Ontology Web Language (**OWL**), in fact, can be used by any SME if the information reaches them. The workshop has been organized based on the fishbone approach and has therefore covered different aspects such as the need for extra legislation, Research & Development, standards activity and complementary measures.

All these aspects need to be covered in order to provide the society with a more efficient exchange, storing and management of data for Life Cycle Assessment (**LCA**) and management of environmental data.

The use of Product Data Technology (**PDT**) can ensure, in a cost-effective and harmonized way, the longevity and transferability of environmental data for statistical use and for product improvement and will also increase awareness of that issue maximizing the benefit for the society.

3. Integrated Policy Product (IPP) and Environmental Product Declaration (EPD)

Following the adoption of the Green Paper on Integrated Product Policy (IPP) in February 2001 the European Commission embarked upon a stakeholder consultation exercise. In addition the Commission has organized a series of meetings and expert workshops on particular aspects of IPP. Participants were selected on the basis of their expertise and experience but no-one from the Product Data Technology was invited.

The environmental innovation of products is recognized as one of the principal instruments for the promotion and integration of competitiveness, innovation and sustainability that are key priorities for the European Union [COM(2004) 38 final], [COM(2003) 302 final], [www.europa.eu.int/comm/enterprise/innovation/consultation/docs/innovate.pdf].

LCAs provide the best framework for assessing the potential environmental impacts of products currently available. They are therefore an important support tool for IPP..." [COM (2003) 302 on IPP].

Life Cycle Assessment (LCA) is an internationally standardised method (ISO 14040 ff) for the evaluation of the environmental implications of goods, services, installations and technologies along their life cycle. It helps to

- avoid the “shifting of burdens” from one life cycle phase to another, among the various environmental implications
- evaluate the improvement options.

A general schema of life cycle is represented in fig.1. The schema underlines the importance of accurate information on Life Cycle Data along the life of a product from the “cradle to the grave”.

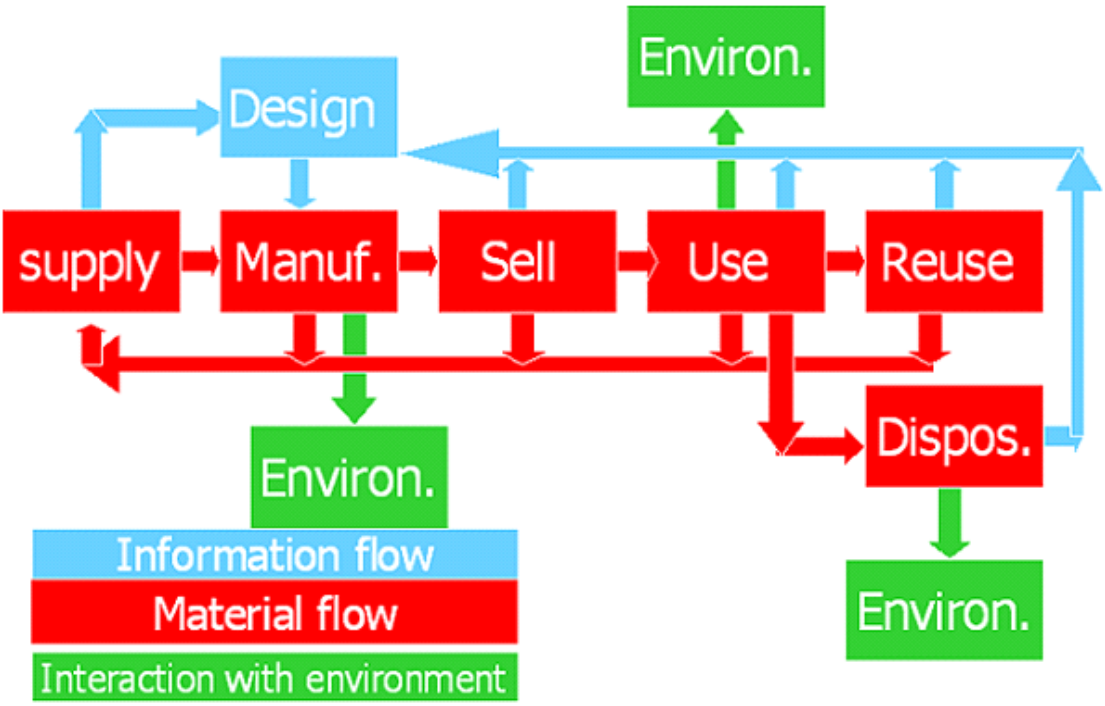

Fig. 1. Design for the environment

There are many examples of Life Cycle Thinking in general EU Policy:

- Strategy for Prevention and Recycling of Waste
- Strategy for Sustainable Use of Natural Resources
- Integrated Product Policy Communication
- Waste Framework Directive (stakeholder discussions)
- Strategic Environmental Assessment Directive – plans / programmes

Besides, there are already a few Examples of Life Cycle Thinking Inputs to EU Policies

- Packaging waste Directive – Life cycle based cost-benefit analysis
- Waste oils Directive – Stakeholder consultation inputs based on LCA studies
- Eco-design requirements for energy using products Directive - study on Ecodesign
- of EuP methodology, study on eco-design of television devices, EPIC-ICT project.

- Construction Products Directive (CPD) – LCA of PVC and principally competing materials, LCA tools workshop (2002), CEN Mandate M350 – int. env. performance for buildings (EPDs)

EU has funded numerous LCA Research Projects. Some examples are:

- CASCADE
- COST 530
- DANTES
- ECLIPSE
- e-LCA
- RAVEL/REPID
- LICYMIN
- INTEND
- OMNIITOX
- OSELCA
- LIRECAR
- LCA-IWM

Some initiatives to integrate the outcomes of these projects have been realized and some good results have been promoted. During the Vico Equense workshop other considerations have been underlined and in the following paragraphs the outcome of these considerations is described.

4. Ambitious objectives

By following the “fishbone approach”, represented in figure 2, the following ambitious objectives have been identified:

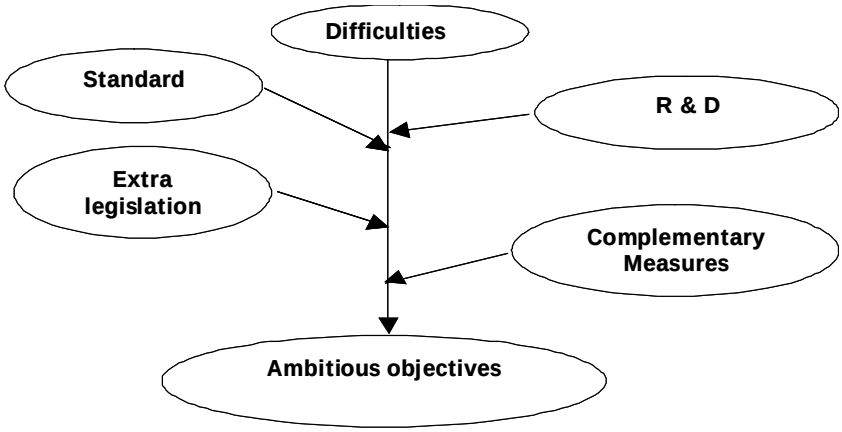

Fig.2, The fishbone approach

- It is necessary to facilitate the effective use and acceptance of LCA by all stakeholders
- There is the need to improve LCA data quality and reliability
- The LCA data exchange must be fast, easy and cheap
- It is crucial to enable a market for green service for green products
- It is indispensable to increase the awareness of enterprises, decision makers and final consumers'
- It is mandatory to ensure the LCA software interoperability
- It is compulsory to integrate LCA software with existing PDT standards in order to promote Life Cycle Design
- The availability of LCA data on the Web is essential for the SMEs that are required to provide the LCA for their numerous customers.

In particular, meeting the objectives of LCA data availability through the web will enable LCA data to be published by government bodies, trade associations and suppliers of goods and services in a form that can be imported directly into LCA software tools. Where the information is published on the Web it will be accessible to semantically precise "Google like" queries.

5. Identified difficulties

In order to reach the ambitious objectives mentioned above, the following difficulties and/or obstacles have to be removed:

- Different LCA approaches have been developed and they are not compatible
- There is inconsistency for LCA data in the existing application
- There is an objective difficulty in LCA maintenance and updating as they are conceived now

- There is lack of awareness for PDT and LCA added value and benefit
- There is a limited market for software applications
- As a consequence of the above problem there is also poor quality of existing software and data
- Despite the enhancement of the web market there is a lack of a standard format for publishing LCA data on the web

6. Need for standards

In order to remove the above obstacles, different actions have to be undertaken. In the field of standards, the objective is a unified approach to the reference data required by manufacturing and process plant design, operation and maintenance and the life cycle assessment of processes and products. These data encompass:

- Process plant data as already standardized in ISO 15926-4,
- Material information concepts defined within ISO 10303-235,
- The concepts and nomenclatures defined within ISO 14048,
- Other nomenclatures required for the use of ISO 14048 including geographic nomenclatures and substance nomenclatures.

The Cascade project has added LCA capabilities to some standards, such as ISO 15926-4 RDL and ISO 10303-235. This work has shown that lack of reference data, especially for areas outside ISO 14048 but necessary for the use of ISO 14048, is a problem for its practical use. The lack of a standard computer interpretable format for ISO 14048 was also a problem, but the CASCADE project showed that this could be remedied by the use of ISO TC184/SC4 technologies. ISO TC 207 has approved the continuation of ISO TS 14048 but this standard should be improved in this respect.

Therefore, it is highly recommended that a joint working group, involving ISO TC184 and ISO TC207, develops an approach for the full spectrum of reference data required for the use of ISO 14048 and its integration within design, procurement, operation and maintenance, and disposal activities. This group will carry out the following tasks:

- the publication of the concepts and nomenclatures defined within ISO 14048 as computer interpretable reference data,
- a multilingual web site with RDL for specific LCA terminology (could be created and maintained by JRC to support Community policies);
- additional standards requirements resulting from existing and forthcoming environmental legislation to be identified;
- liaison with standards bodies responsible for geographic reference data and for chemical reference data,

- liaison with standards bodies concerned with the web publication of semantically precise data.

In order to have the greatest effect, a proposal for any new work required has to be forwarded to TC184 SC4 through CEN TC 310 based on the main conclusion of the Trends Analysis Workshop.

A single standard that covers the full life cycle is needed from cradle to grave. This standard should communicate with the already existing international standards and the existing commercial products for LCA. Only with such a standard will a real IPP become possible. The enterprises need to be provided with easy solutions for the EPD.

ISO 15926 has this basic capability but there is the need for some extensions. The ontologies should also be available as OWL (Web Ontology Language) to support publication of LCA data on the Web.

7. Extra legislation

In order to achieve a broad awareness and push the market in the right direction the following actions at the EU level should be taken:

- IPP should include the use of PDT standards on a recommended basis with a mandatory use of standardized terminology available

- Any directive, regulation or communication on the maintenance and the updating of LCA data for products should be based on existing international standards.

8. Research & Development

The EU directives and/or recommendations should be supported by research and development activities such as:

- PDT standards research and development promoting the use of the existing ISO TC 184 SC4 standards to support new environmental applications

- New generation development of PDM and LCA software tools compliant with ISO 14048 and SC4 family of standards

- Upgrading of the existing LCA software tools in order to add capability to interface LCA standards (ISO 14048, ISO 15926 and ISO 10303-235).

9. Complementary measures

Finally, a set of actions at international and/or national level could be promoted in order to increase the possibility of a broader awareness for the life cycle impact of products:

- Build and maintain a web site with simple solutions for SMEs in order to submit and publish LCA data according to ISO 14048.

- A European LCI database implemented with an import/export function to SC4 standards to facilitate industrial exploitation

- Free e-learning courses translated in all EU languages for:
    - correct use of PDT standards
    - LCA evaluation
- European Communication to Member States for the promotion of the existing standards both SC4 and ISO 14040 series
- Diffusion of this report through different channels:
    - CEN/STAR
    - CEN TC 310
    - CORDIS
    - EUREKA
    - ISO TC184/SC4
    - ISO TC207/SC5
    - SABE
    - VAMAS
- Award for the production of simple PDM and LCA software for SMEs compatible with SC4 and ISO 14040 series standards
    - EBN
    - UEAPME
- Grant for University students for theses developed in the field of SC4 and ISO 14048 compliant PDM software.

Within the CASCADE project, ENEA (Italian national agency on Environment New Technologies and Energy) has developed three free e-learning courses on LCA; besides, inside the **O**utreach and **E**ducation **C**ommittee (**CEO**) of ISO TC184/SC4 it has developed a free e-learning course on SC4 for newcomers. All these courses are freely accessible at: www.pdt.enea.it.

10. Conclusion

The CASCADE project has given evidence of the capability of merging existing ISO SC4 and ISO 14040 series of standards. More work is necessary to make the result of this project into workable solutions for industry and especially for SMEs.

Many important initiatives are under way in order to solve pending issues, the risk is that overlapping and mismatch of activities could occur and therefore a strategic action for coordinating the different activities is compulsory in order to obtain the best sharing of the expertise knowledge in different fields for everyone’s benefit.