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## **INTERACTIVE WAY TO TEACH ABOUT LIFE CYCLE THINKING AND ASSESSMENT**

*Jean-Pierre THERET\**, Dassault Systèmes; 10 rue Marcel Dassault, 78140 Velizy, France ;  
Tel: +33(0)6 2080 5969; e-mail: jeanpierre.theret@3ds.com

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### **ABSTRACT**

Life Cycle Thinking for product development is part of the fundamentals for better practices in design. This approach is not so easy to communicate even to Designers or to Engineers, because it requires an holistic view on the product from raw materials apportionment to the product end-of-life.

Communicating and teaching on this approach may benefit of innovative method, like the one coming from the mind mapping.

This paper describes a way to explain the main concepts and features of the Life Cycle Thinking with a very simple good: the shampoo. Three scenarios are investigated: assess the environmental performance of the shampoo; compare it to another one; enhance the product.

### **INTRODUCTION**

Life Cycle Thinking (LCT) is not so easy to understand for all actors in the Value Chain, as well as the Life Cycle Approach (LCA) to assess to environmental performance of a Product during its development or for a communication purpose.

One way is to teach and to train about “Design for Environment” and “Life Cycle Assessment” based on the ISO 14040 / ISO 14044 norms, the ELCD Hand-Book and other guidelines... explaining principles, concepts, and presenting methods and tools. Then the Value Proposal may be illustrated by several successful eco-friendly products development.

But like this, many new concepts and information should be learned at a time with difficulties to understand them at a whole.

New teaching approaches need to be tested for more efficiency and a better audience.

### **METHODS**

A new way to teach and to learn may be an interactive one between the trainer and the trainees driven to make the attendees discovering on their own the Life Cycle Approach principles, considering common goods, like shampoo.

The trainer would use:

- Three shampoos (see Figure I): one with a secondary paper packing, one without, and one soap for the three phases of the presentation: evaluate, compare and enhance;



Figure I. Three shampoos

- One map minding tool, the open source FreePlane (...).

The approach for this short training (2 to 3 hours as an overview) is based on self-discovering by the trainer of the principles: environmental impacts & indicators, life cycle, stages, function & functional unit, materials & energy flows, inventory, load factors, mid-points and end-points indicators, 4 levels of the design for the environment...

This approach is also progressive in addressing concepts through three cases treated separately: how to assess the environmental performance of a product, how does it compare to another product, how to improve a product from an environmental point of view?

(Flore Vallet, 2012) has proposed a framework for EcoDesign that may be used for training and that includes three dimensions:

- Dimension related to the designed process of products: several criteria and all phases of the product life cycle should be considered;
- Dimension related to the Supply Chain: many actors are involved in the development of the product all along its life cycle;
- Dimension related to the context of the development of a new product: level from continuous enhancement, re-engineering, new concept to system change; and the different steps of the environmental design.

The proposed approach for training covers for sure the two first ones, and may include the third one depending on the complexity of the case and the available time for the training session.

This approach also falls under the "method by example" category where the activity is carried on a concrete example from where concepts and principles are identified and explained. The trainees know the shampoo, but the trainer should make them discover the hidden face of the shampoo to understand what are the environmental impacts of it with an holistic approach considering the whole life cycles of its components and the product itself.

## RESULTS

With this method, start simple with the basic map including the three activities "Evaluate", "Compare" and "Enhance" like Figure II.



Figure II: Starting map.

The trainer role would be to ask questions to the trainer and assess if there are skilled people among them to organize knowledge transfer between them and the beginners. The training is much more efficient when trainees exchange their knowledge.

The trainer is the animator and would ask questions in cascade to make concepts discovered when studying the shampoo: What are the shampoo environmental impacts? What is a shampoo made of? Why the shampoo causes impacts? Etc.

For that consider the first shampoo sample, the one with the secondary packing which is supposed to be the more impacting one.

Make all the Life Cycle Assessment features be discovered in any order and that is a very powerful capability of the mind mapping tool.

The result may be like Figure III for “Evaluate”, or any other map, because the most important is that the trainee discover a bit of the Life Cycle Thinking, not the full picture in once!

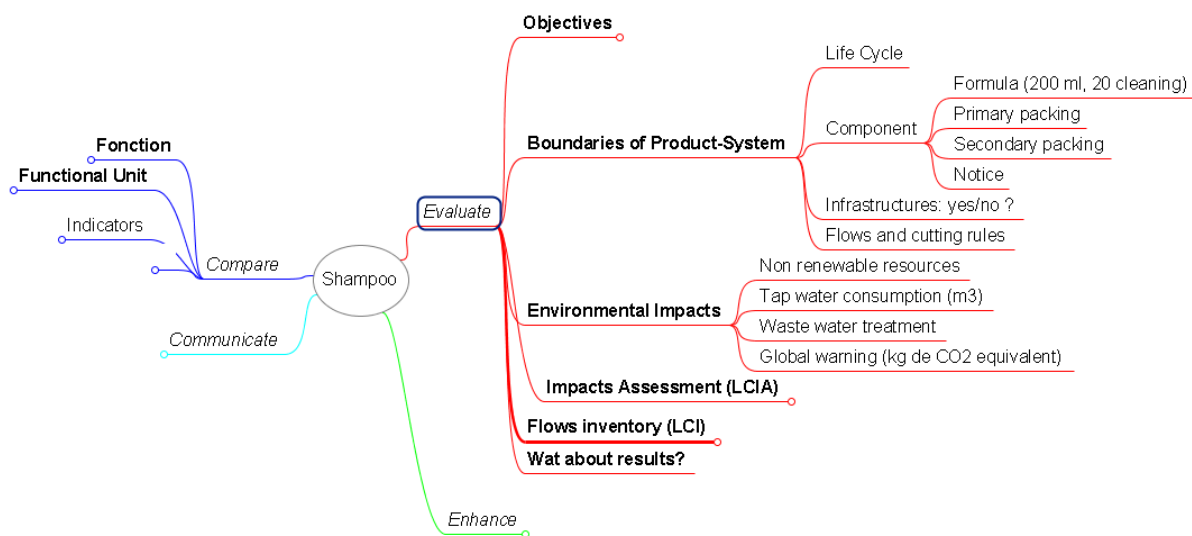


Figure III: Map for Evaluate the shampoo

Function, Functional Unit and other main concepts for LCA may discover later with the second step: Compare the packed shampoo with the second one with no secondary packing.

Then the last proposed step will be to discover how to enhance the two first products; don't show the soap at the beginning but at the end as a new possible product that is functionally



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equivalent to the two other shampoo (ask to your local drugstore to explain that to you before).

You can also with that way investigate other activities: how to communicate? How to capitalize? Etc.

## **DISCUSSIONS AND PERSPECTIVES**

This approach has been experimented several times for first teaching or overview about Life Cycle Thinking & Assessment of products with success. Feedbacks from the attendees were good; some of them have required again this training session for other conferences or workshops.

It would be interesting to investigate such training approach for longer and more complete training and study how the trainees can appropriate the mind mapping approach for their own knowledge transfer to other trainees, and also the tool (FreePlane, 2012) for an advanced usage of it.

Please send me back your experiences with similar approach!

## **REFERENCES**

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