CEGE0059 Life Cycle Assessment

Introduction to LCA

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Introduction to LCA

What is LCA?

Why is it important?

Stages in LCA

ISO and SETAC

What is LCA?

An environmental management tool to determine the environmental impact of a product or system over its whole life – from production, through use and to recycling, reuse or disposal (from the “cradle to the grave”).

Why is LCA important?

Considered the most credible way to inform decision making about the **total** environmental impacts of products, services & systems

Provides the evidence needed to:

- Reduce environmental pollution and resource use
- Avoid shifting environmental impacts
- Minimise secondary effects if used in conjunction with design
- Meet environmental regulations
- Support innovation in design and manufacturing

A brief history

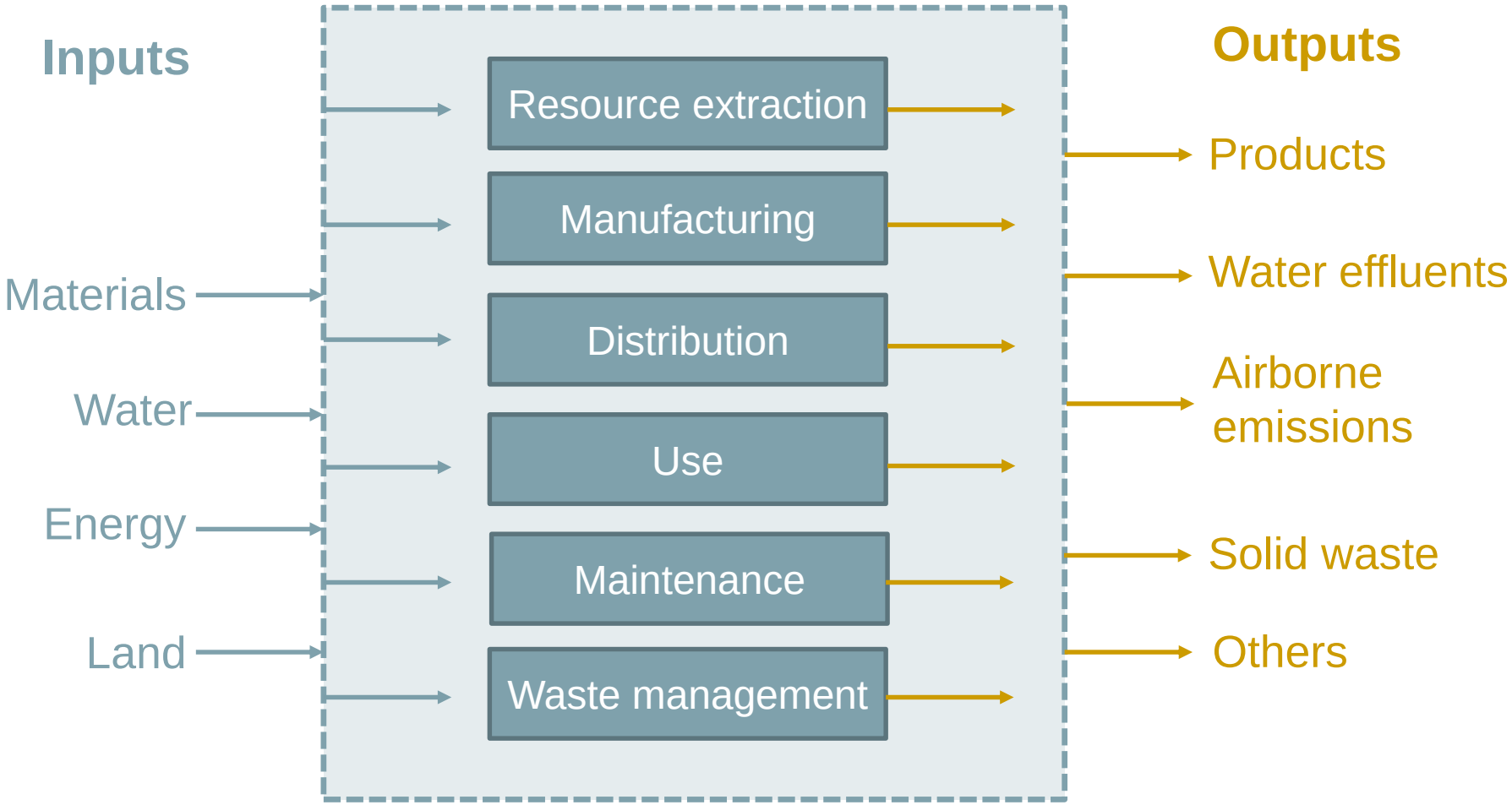
Originated from energy analysis and some claim first LCA carried out by coca cola in 1969

SETAC set first standards in 1990

ISO produced series of standards in 1997/98 which were recently revised in 2006

- ISO 14040:2006 outlining LCA principles and framework
- ISO 14044:2006 for requirements and guidelines

What's considered in an LCA?

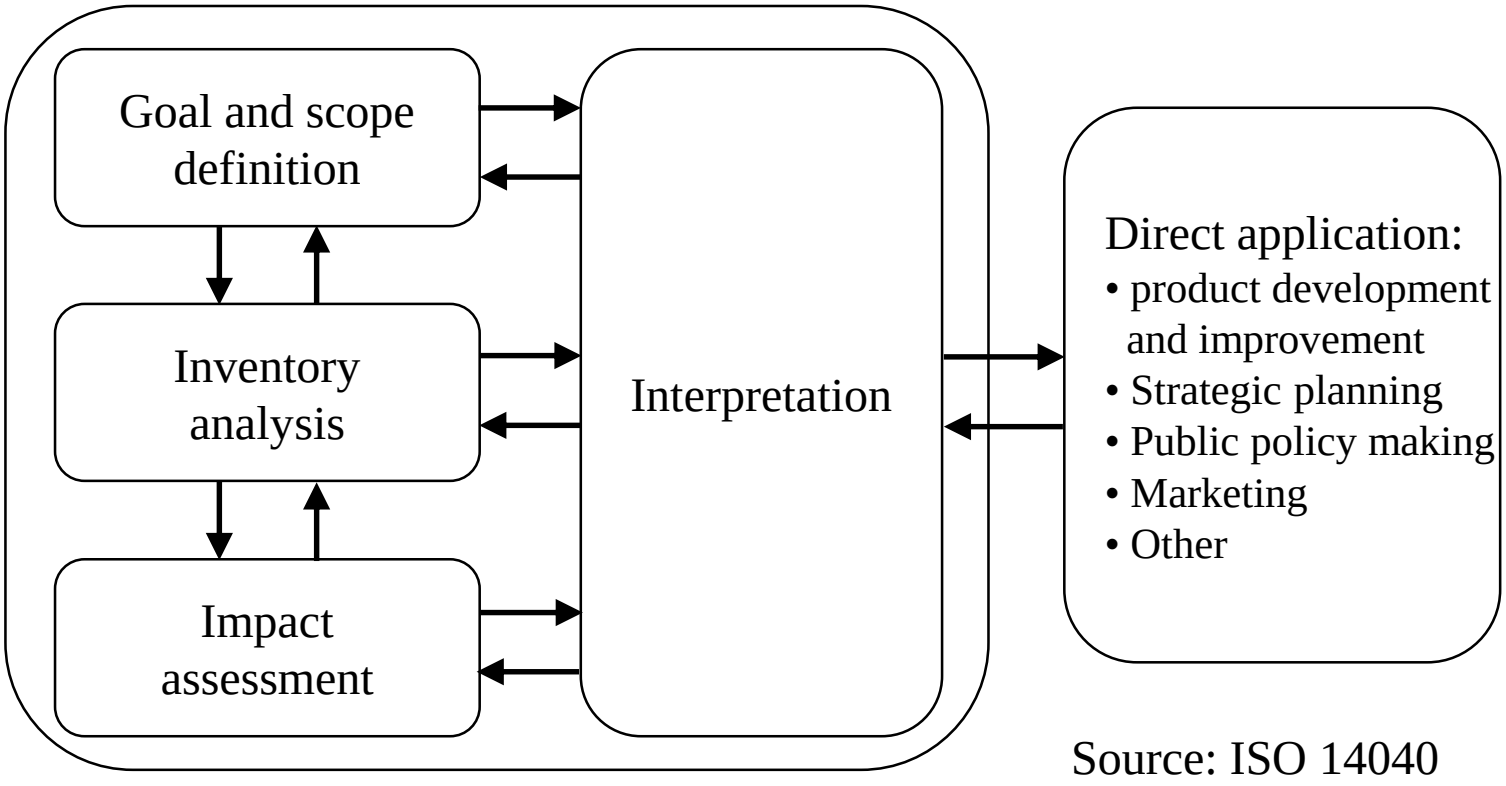


The Stages of LCA

- Goal Scoping
- Inventory
- Impact Assessment
  - Classification
  - Characterisation
  - (Normalisation)
  - (Weighting)
- Improvement Assessment - Interpretation

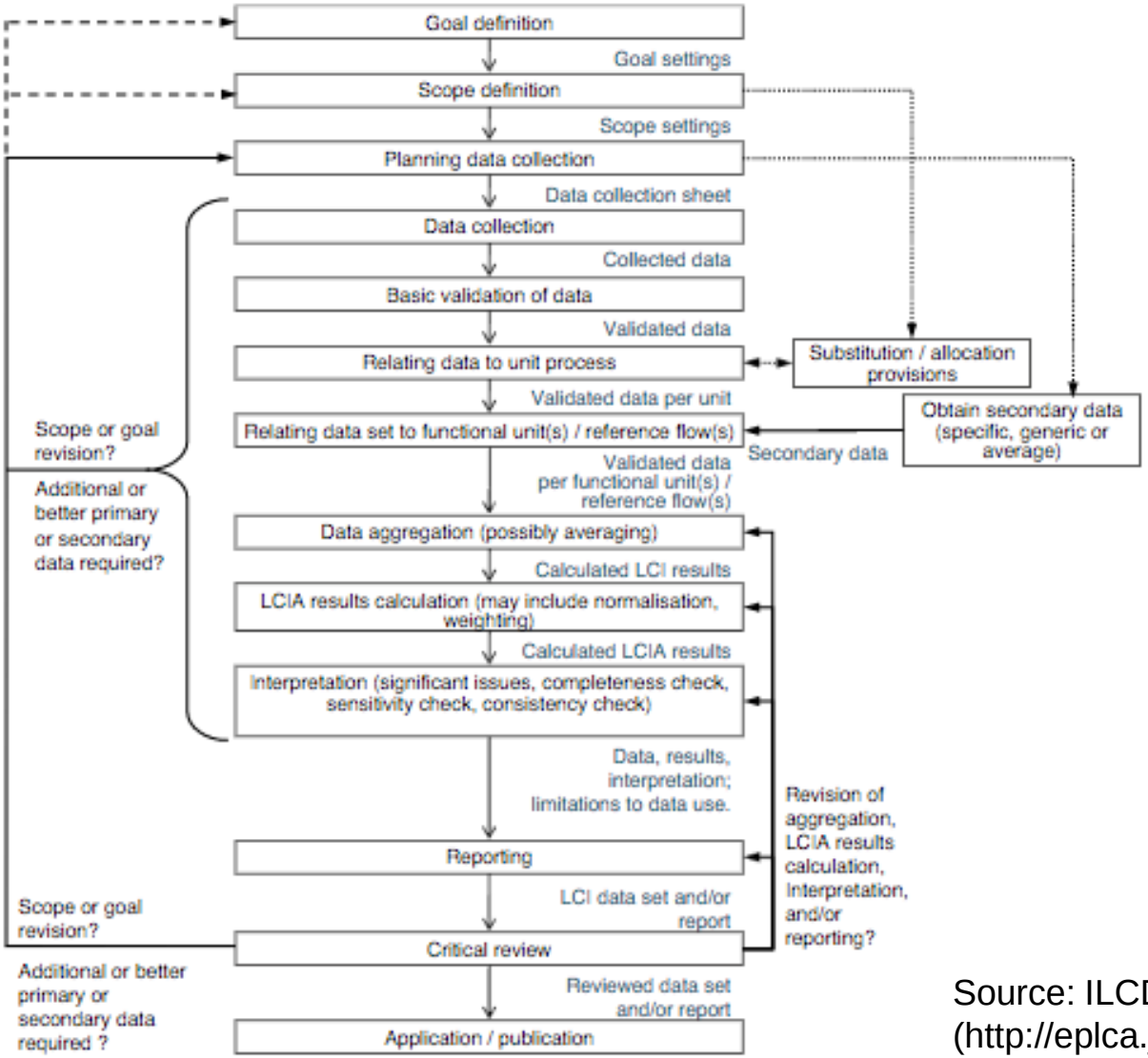
Life Cycle Assessment Framework

Four different phases of LCA can be distinguished:



Source: ISO 14040

LCA: an iterative process



Source: ILCD Handbook, First Edition (http://eplca.jrc.ec.europa.eu/?page_id=86)

Goal Objectives

Important first stage of any assessment - rather like a scoping study (or initial specification)

Reason for carrying out the study

Defines the aims and objective of the study (eg is it to be used as a comparative assertion disclosed to the public)

Intended audience and use of results

Who has commissioned the work

Scoping Objectives

The function of the system and the functional unit

The system boundaries

Dealing with multiple outputs – allocation

Data quality, availability and sourcing requirements

Type of critical review (if any)

Functional Unit

Describes the primary function(s) fulfilled by a (product) system

Indicates how much of this function is to be considered in the intended LCA study

Used as a basis for selecting one or more alternative (product) systems that can provide these function(s)

Enables different systems to be treated as functionally equivalent and allows reference flows to be determined for each of them.

Inventory

The data collecting stage

- Data collected from source, literature or software (most commonly all three)
- Gathered and analysed in a large spreadsheet or LCA specific software
- Time consuming

Impact Assessment

Have long list of materials/emissions in inventory

Look at the contribution to pre-determined effects (subjective)

Effects generally considered - contribution to: greenhouse gases, acidification, ozone depleting gases, eutrophication, winter and summer smog, solid waste, heavy metals, energy use and carcinogens.

Four stages to Life Cycle Impact Assessment:

- Classification
- Characterisation
- Normalisation
- Weighting

Improvement Assessment

This stage identifies areas which have the potential for improvement within a system.

Reliant on the practitioner noticing not only areas which have significant environmental effects but also those with smaller effects where changes could be made easily. A number of this type of change can result in a large improvement overall.