

# Training on Advanced Dataset Development, Documentation and Exchange

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## Introduction

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### Disclaimer

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

# Training Course - Contents

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Introduction
Part 1 - Dataset documentation
Part 2 - Responsible management practices in LCA databases - concepts and criteria Part 2a - Responsible management practices in LCA databases - training exercise Part 3 - Set-up and operation of online database and portals
Part 4 - Reviewing data from LCI datasets - concepts and criteria Part 5 - Reviewing data from LCI datasets - exercise
Part 6 - Roadmapping for the Peruvian National Database Part 7 - Presentation of Thai National Database Development Pathway

# Training on Dataset Development, Documentation and Exchange

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## Excel Sheets in Annex

### Part 2a Exercise

“5c\_rmp\_scoring\_template\_english”

“5d\_rmp\_scoring\_template\_spanish”

### Part 4 Exercise

“7b\_dataset\_review\_-\_evaluation\_template\_2016\_english”

# GLAD Initiative

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## Overview and Objectives

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# Background on the Forum\* and GLAD

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- Began in 2012 as an intergovernmental forum with a focus on enabling national life cycle-based policies
- Organized by the EC and UN to facilitate development of life cycle-based policies at the national level
- Original policy focus has evolved to include a strategy to provide tangible products as outputs and specific plans to create tools and mechanisms for data sharing
- Meetings in Malaysia, USA, and Brazil



\*International Forum on LCA Cooperation

# GLAD: Ambition

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*“Deliver by 2017 an electronic system and protocol ... to enable access by users to the majority of the LCA databases ... meaning that the LCA datasets and other data therein can be easily accessed in an exchange format that allows using them seamlessly in LCA software, assessing ‘fitness for purpose’ by an end user...”*

# GLAD: Governance and Organization

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UN Environment serves as the Secretariat of the GLAD network, with representatives from 14 governments in the Steering Committee.

## Steering Committee



Ibict



MMA



CNIS



EC DG-ENV  
DG-JRC



Ademe



BMBU



Minambiente



METI



MOSTI



INEGI



Naturvardsverket



MTEC



BAFU



USDA



# Global LCA Data Access (GLAD)

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- Life Cycle Assessment (LCA) data allow policy makers to develop sound sustainable consumption and production policies, and industries can base their innovation and strategic sustainability decisions on more robust information. Enhanced data accessibility and interoperability benefits the whole life cycle community and affects the way in which Life Cycle Assessment (LCA) goes mainstream.
- The “Global LCA Data Access” network (GLAD) aims to achieve better data accessibility and interoperability. The network will be comprised of independently-operated LCA databases (nodes), providing users an interface to find and access life cycle inventory datasets from different providers. GLAD will thus support life cycle assessment through easier access to data sources around the world.
- One of the main functionalities of GLAD will be the conversion function which will allow users to convert a dataset from its native format in the source database (node) into another format convenient for the user. This functionality is based on key metadata descriptors that will be required from datasets to be connected to GLAD in order to allow for interoperability between them, as well as a global mapping of elementary flows’ nomenclature.

# Global LCA Data Access (GLAD)

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- GLAD is a website which provides users an interface to find and access life cycle inventory datasets from different dataset providers.
- GLAD delivers two main services:
  - Find datasets (through a search component, including globally agreed metadata descriptors);
  - Use datasets (by allowing their conversion and download into the user's software, in the desired format).
- Added value of GLAD comes from:
- Massively increased access to data (benefit for data providers, as well as for users of data);
- Facilitating interoperability of data formats (with a view to gradually harmonised LCA datasets)



# Global LCA Data Access (GLAD)

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- In order to ensure interoperability of datasets, working groups involving global experts from governments, academia, and LCA data and software providers were established around the following areas:
  - I. “Network Architecture and Technology”, which defined the specifications of the IT environment required for the network;
  - II. “Nomenclature”, delivering a global elementary flow mapping file for Life Cycle Inventory datasets; and,
  - III. “Metadata descriptors”, delivering a basic list of metadata descriptors to facilitate interoperability and the assessment of "fitness for purpose" by users, as well as advanced recommendations on how interoperability and assessment of fitness for purpose can be enhanced in the future.

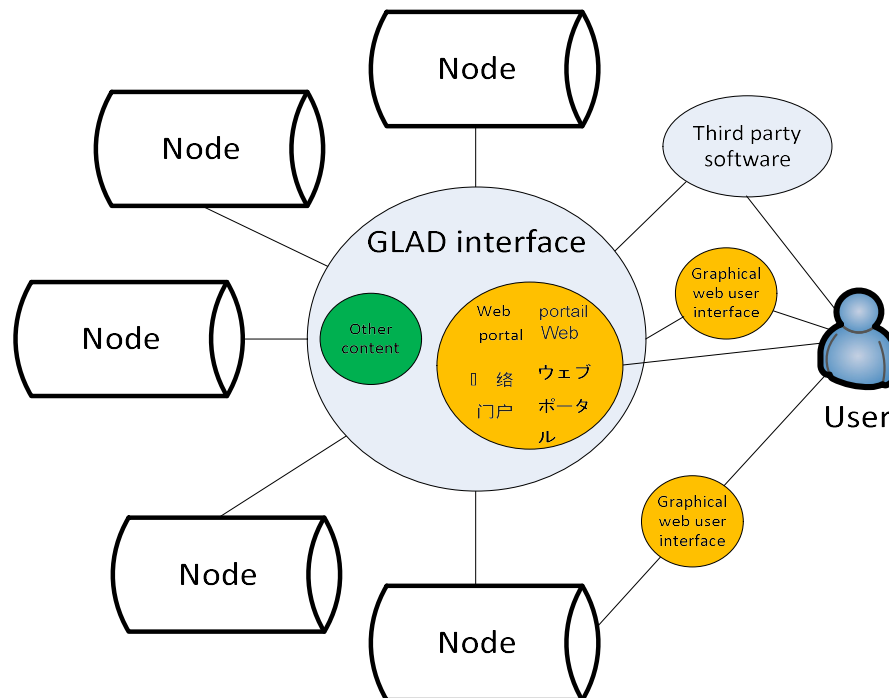
# Principles and Rules Adopted

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- **Network should be open.** Data should be accessible and extendable to all interested users and the network should include data from a variety of sources in different formats, as long as those formats meet some common minimum requirements.
- **Direct access is required to the metadata** allowing the assessment of fitness for purpose by the user, whereas access to the datasets themselves may be subject to restrictions (e.g. available for a fee, or only for authorized and registered users);
  - Any restrictions of access to parts of the network must be transparent.
- **Inclusiveness:** All nodes willing to join (private and public) can join, if they agree with the partnership agreement
  - Datasets need to meet minimum requirements for interoperability (defined in terms of flow nomenclature and metadata descriptors).
  - Requirements for the nodes themselves are also defined by the Network's Steering Committee (or governing body), and the requirements are the same for all nodes
- **All nodes abide to the same rules** (no special rules for commercial nodes)
- Nodes are **encouraged to provide transparent data.**
- Provided **data must be correct** (no QA on the network)

# Network Architecture

Potential future structure of GLAD



*Central, multi-lingual, user interface, enabling access to **nodes** worldwide, ensuring interoperability through agreed nomenclature and metadata descriptors*



# Expected operation of the Network - Nodes

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- From the **NODES' point of view**, the operation would be as follows:
- **Nodes decide to become accessible** through Global LCA Data Access (all or part of datasets)
- **Automated test of compliance** with requirements -
  - Nomenclature
  - Metadata
- Node signs up to the rules of Global LCA Data Access / Partnership agreement
- Node adapts connection/access of its datasets metadata from the central interface API
- **Connection made with Node** through API (Application Programming Interface)
- Whenever datasets are searched in Global LCA Data Access, compliant (interoperable) **datasets in the node are included in the search, and the list of datasets fitting the search criteria are returned with access to their metadata**
- **Node communicates clearly the licensing terms** of the data stored within it



# Role: Node Operator

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- **Node signs up** to the rules of Global LCA Data Access Network
- **Node adopts connection/access** of metadata for its datasets using the central interface API
- **Connection made with Node** through API (Application Programming Interface)
- **Nodes become accessible** through Global LCA Data Access (all or part of datasets) when approved and fully conforming
- **Automated test of compliance** with requirements is done – covering Nomenclature and Metadata

# Expected operation of the Network - Users

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- From the **USERS' point of view**, the operation would be as follows:
  - The **user identifies a need for specific datasets and contacts the central interface**
  - The central interface helps **user identify the list of available datasets in the network's nodes that comply with search criteria** (informed by metadata requirements)
- **Such datasets would be stored in their respective nodes not in GLAD**
- The user can then decide, with his/her own responsibility, the best dataset, pay for it if required, and import into the LCA software with the required exchange format to enable seamless use in the software. **The network will not be responsible for any consequences resulting from users' decisions.**



# Format and Nomenclature Functionality

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- GLAD will facilitate on-demand conversion of the datasets formats including the fields that are listed as basic metadata (the ones being used as search filters) AND nomenclature.
- Instructions on how new formats and mapping files can be created and added to this functionality will be provided to enable data providers and users to expand the conversion accuracy and reduce limitations.
- Provide access to all datasets directly via the registered nodes. These datasets will be in formats as provided by the nodes (not modified by GLAD) and meet minimum GLAD requirements. -
- In addition to its own conversion functionality, GLAD will point users to external tools and services that they can use to perform format, metadata and elementary flow conversion for datasets; provide reference to instructions and mapping files for these tools; and may provide tutorials demonstrating how to use them.

# Meta-indicators

UN  
Environment  
GLAD WG 3  
metadata  
descriptors, task  
3, final draft  
report, June  
2017

		Goal	Value & representation	Conformance
ID	Process name		0a	
	Process type		0b	
gvc Descriptors	Time	Ia	IVa	Ila
	Geography	Ib	IVb	Ilb
	Technology	Ic	IVc	Ilc
	Model completeness	Id	IVf	Ild
	Sample representativeness	Ie	IVg	Ile
	LCA nomenclature systems		IVd	
	LCIA methods	Ig	IVe	
Modeling	LCI modeling type		IVh	
	System boundaries		IVi	
	Multifunctional processes		IVj	
	Biogenic carbon		IVk	
	Land use		IVl	
	Wastes and end-of-life		IVm	
	Water		IVn	
	Infrastructure/capital goods		IVo	
	Long-term emissions		IVp	
	Temporary carbon storage		IVq	
	Sample approach	If		
Sampling	Reliability of the sources used		IIla	
	Aggregation type if any		VIa	
Calculation	Data set review performed		Va	
	Type of data set review		Vb	
	Quality assurance performed		Vc	
	Reviewing person(s)		Vd	
	Copyright protected data set?		VIIa	
QA	Copyright holder		VIIb	
	Free data set or for purchase?		VIIc	
	Data set license		VIIId	
	Data set contact		VIIe	

Descriptor element supported in / provided by

GLAD	ILCD	ILCD & EcoSpold02	EcoSpold02	not applicable	not foreseen	(ILCD)	(ILCD & EcoSpold02)	(EcoSpold02)
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# Meta-data acquisition

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## Meta-data –pre-requisites and criteria...

- Registered Nodes need to be available online, or at least **post the metadata values of their datasets online and offer access to metadata descriptors for free.**
- **Avoid requiring dataset providers to modify their datasets** to be added to GLAD (i.e. nodes that provide or overfulfill the agreed metadata descriptors should be searchable right away without needing to update their datasets).
- The agreed metadata descriptors shall be a cut-set of broadly **existing and already defined metadata descriptors** and not requesting individual wishes or new concepts or ideas of single (new) approaches

# Interoperability Key: Meta-indicators

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- Metadata descriptors are the basis for searching, filtering and sorting across registered nodes. The metadata descriptors defined by GLAD as the minimum set of descriptors to ensure interoperability have been defined.
- For reference, they include fields such as the following (still to be updated on final version approval):
  - Process name (e.g. leather tanning, chrome-based)
  - Process type (e.g. aggregated process; unit process)
  - Represented Time (e.g. 2005 data)
  - Represented Geography (e.g. Italy)
  - LCA nomenclature system(s) supported by the dataset (e.g. ILCD reference flow list, ILCD 1.1 from May 2015, ILCD flowlist February 2017)
  - etc.

# Part 1 - Dataset Documentation

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Content from Reynaldo Felix and Juan Pablo Chargoy, CADIS

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## Disclaimer

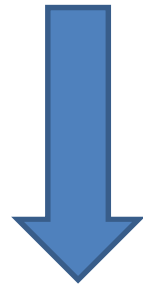
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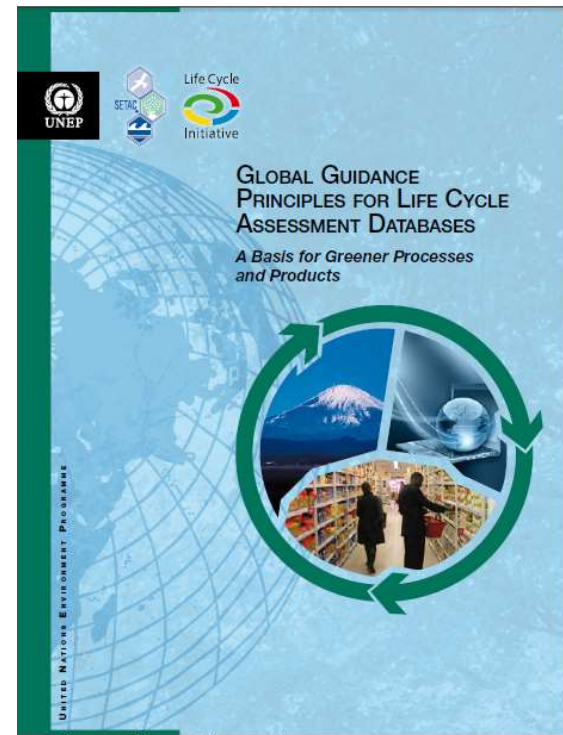
# Dataset Documentation

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What information is needed to document a dataset?



Global Guidance Principles  
for Life Cycle Assessment  
Databases



# Dataset Documentation

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- In a perfect dataset, all of the information or metadata needed to describe the quality and usability of a dataset for a given purpose would be included.
- Generally this level of detail is impractical because of considerations of cost or time.

# Aspects recommended for dataset documentation

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## General Documentation Considerations

- Name and Classification
- Scope of the Dataset
- Functional Unit or Reference Flows
- Allocation
- Data Quality
- Hints on Interpretation

Sonnemann and Vigon, 2011. Global Guidance Principles for Life Cycle Assessment Databases: ***A Basis for Greener Processes and Products***. Shonan Guidance Principles.

# Aspects recommended for dataset documentation

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## Specific Requirements for Documentation of Unit Process Datasets

- Data Sources
- References and Boundaries
- Calculation Models and Other Conventions
- Validation results

Sonnemann and Vigon, 2011. Global Guidance Principles for Life Cycle Assessment Databases: ***A Basis for Greener Processes and Products***. Shonan Guidance Principles.

# Typical structure for dataset documentation

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- General Information
- Administrative Information
- Modeling and Validation
- Parameters
- Flows Exchanges
- Actors
- Sources

# Examples of metadata elements in different data formats

Metadata elements	ILCD	Ecospol V.01	Mexicanuih
Name	Name	Name (reference Function)	Activity name
Base name	Treatment, standards, routes Mix and location types	Type	Type Mix And Location Types
Quantitative product or process properties	Quantitative product or process properties	-	Quantitative Properties of the Product or Process
Category	Classification Top category and Subcategory	Classification Top category and Subcategory	Two types of classification
Version	Data set version		Dataset version
Description Quantitative Reference	Quantitative product or process properties	General comments	Type of Quantitative Reference
Description (Time)	Reference year Data set valid until: Time representativeness description	Start date End date text (Time period)	Start date End date Data valid per entire period? Time representativeness description
Description (Geography)	Geographical representativeness description	text (Geography) short name	text (Geography) short name Geographic sublocalization

# More examples of metadata elements in different data formats

Metadata elements	ILCD	Ecospold V.01	Mexicanuih
Description (technology)	Technology description including background system	Text (technology)	Technical description
Intended application	Intended applications	In general, comment (reference function)	Advice for users
Data generator (actor data set)	Data set generator / modeler (contact for data set)	Person (data generator and publication)	Data generator and publications
Data set owner (actor data set)	Owner of data set (contact for data set)	Person (data generator and publication)	Data generator and publications
Data documenter (actor data set)	Data set documenter (contact for data set)	Person (Data generator and publication - Data entry by)	Data entered by
Publication (source data set)	Unchanged republication of (source data set)	Source text (source)	Principles of selection and consistency of data sources
Creation date	Timestamp (last saved)	Timestamp	-

# Still more examples of metadata elements in different data formats

Metadata elements	ILCD	Ecospold V.01	Mexicanuih
Copyright (Y/N)	Copyright?	Copyright?	Copyright?
LCI Method	LCI method and allocation	Allocation comment (flow dataset)	Type of assignment
Process type	Type of data set	Type (dataset information)	Type model ICV method principle
Data completeness	Data cut-off and completeness principles	General comment (flow dataset)	Name and value of quality
Data treatment	Data treatment and extrapolations principles	General comment (flow dataset)	Extrapolation comment on type of modeling and extrapolation
Sampling procedure	Sampling procedure	Sampling procedure	Sampling procedure
Reviewer	Reviewer name and institution	Reviewer	-
Sources	Data sources used for this data set (source data set)	Source	Principles of selection and consistency of data sources
Flow (flow dataset)	Flows - input/output	Exchanges - input/output group	Flows
Uncertainty	Uncertainty distribution type	Uncertainty type	Uncertainty type



# A note about GLAD

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- GLAD is an acronym that stands for Global LCA Data Access network. It is part of an intergovernmental effort established in 2014 to address LCA and data quality for policymaking. The Global LCA Data Access network aims towards **“a global network comprised of independently-operated and interoperable LCA databases, connecting multiple data sources to support life cycle assessment”**
- Reference: <https://www.unep.org/resourceefficiency/what-we-do/assessment/life-cycle-thinking/global-lcadata-access-network>)

# GLAD services

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GLAD will be set up as a website which provides users an interface to find and access life cycle inventory datasets from different dataset providers.

GLAD delivers two main services:

1. Find datasets (through a search component, including globally agreed metadata descriptors);
2. Use datasets (by allowing their conversion and download into the user's software, in the desired format). Essentially, GLAD will allow users to convert a dataset from its native format in the source database (node) into another format convenient for the user.

# GLAD functionality

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- The functionality of the interface is based on key metadata descriptors that will be required from datasets to be connected to GLAD in order to allow for interoperability between them, as well as a global mapping of flows nomenclature.
- The platform will consist of a central portal and connected datasets (nodes) representing data providers who wish to share databases and datasets through the network with users around the globe.
- Nodes will be required to meet certain requirements for interoperability in order to be connected to GLAD.
- It is expected to launch the data network by the end of the first quarter 2018.

# Metadescription considered for GLAD

Note that only the top two groups of descriptors are being considered candidates as minimum required for interoperability

Source: Andreas Ciroth, Peter Arbuckle, Edivan Cherubini, Cassia Ugaya, and Ashley Edelen, "Core meta-data descriptors and guidance on populating descriptors". Release version 1.0 (internal version 11.3), June 2017. (A work product of the GLAD Initiative, WG3)

		Goal	Value & representation	Conformance
ID	Process name		Oa	
	Process type		Ob	
gvc Descriptors	Time	Ia	IVa	IIa
	Geography	Ib	IVb	IIb
	Technology	Ic	IVc	IIc
	Model completeness	Id	IVf	IId
	Sample representativeness	Ie	IVg	IIe
	LCA nomenclature systems		IVd	
	LCIA methods	Ig	IVe	
Modeling	LCI modeling type		IVh	
	System boundaries		IVi	
	Multifunctional processes		IVj	
	Biogenic carbon		IVk	
	Land use		IVl	
	Wastes and end-of-life		IVm	
	Water		IVn	
	Infrastructure/capital goods		IVo	
	Long-term emissions		IVp	
	Temporary carbon storage		IVq	
	Sample approach	If		
Sampling	Reliability of the sources used		IIIa	
Calculation	Aggregation type if any		Vla	
	Data set review performed		Va	
	Type of data set review		Vb	
	Quality assurance performed		Vc	
QA	Reviewing person(s)		Vd	
	Copyright protected data set?		VIIa	
	Copyright holder		VIIb	
	Free data set or for purchase?		VIIc	
	Data set license		VIIId	
	Data set contact		VIIe	
Administrative				

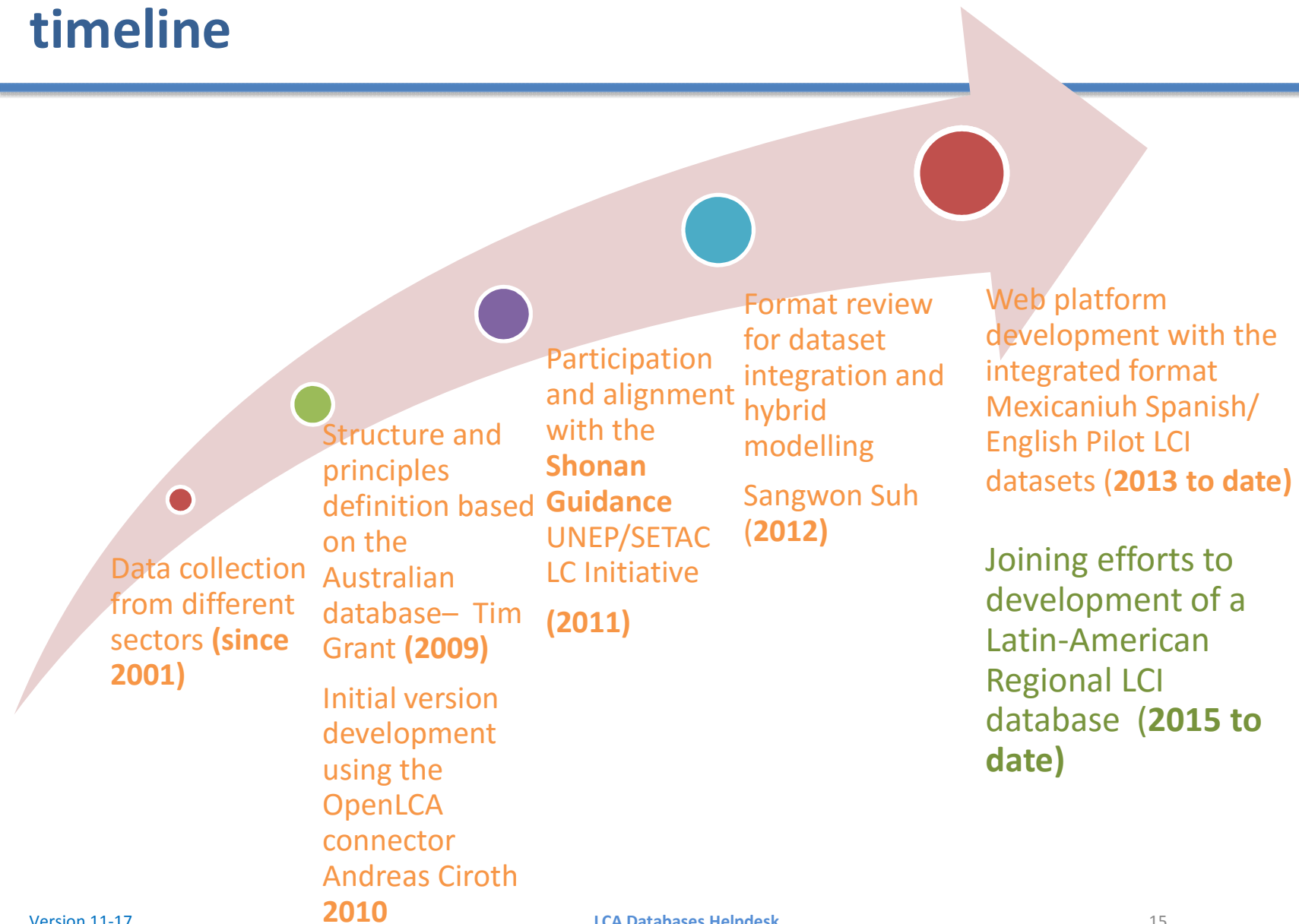
# Examples of metadata for dataset documentation

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Using the Mexicaniuh platform –  
example of dataset documentation

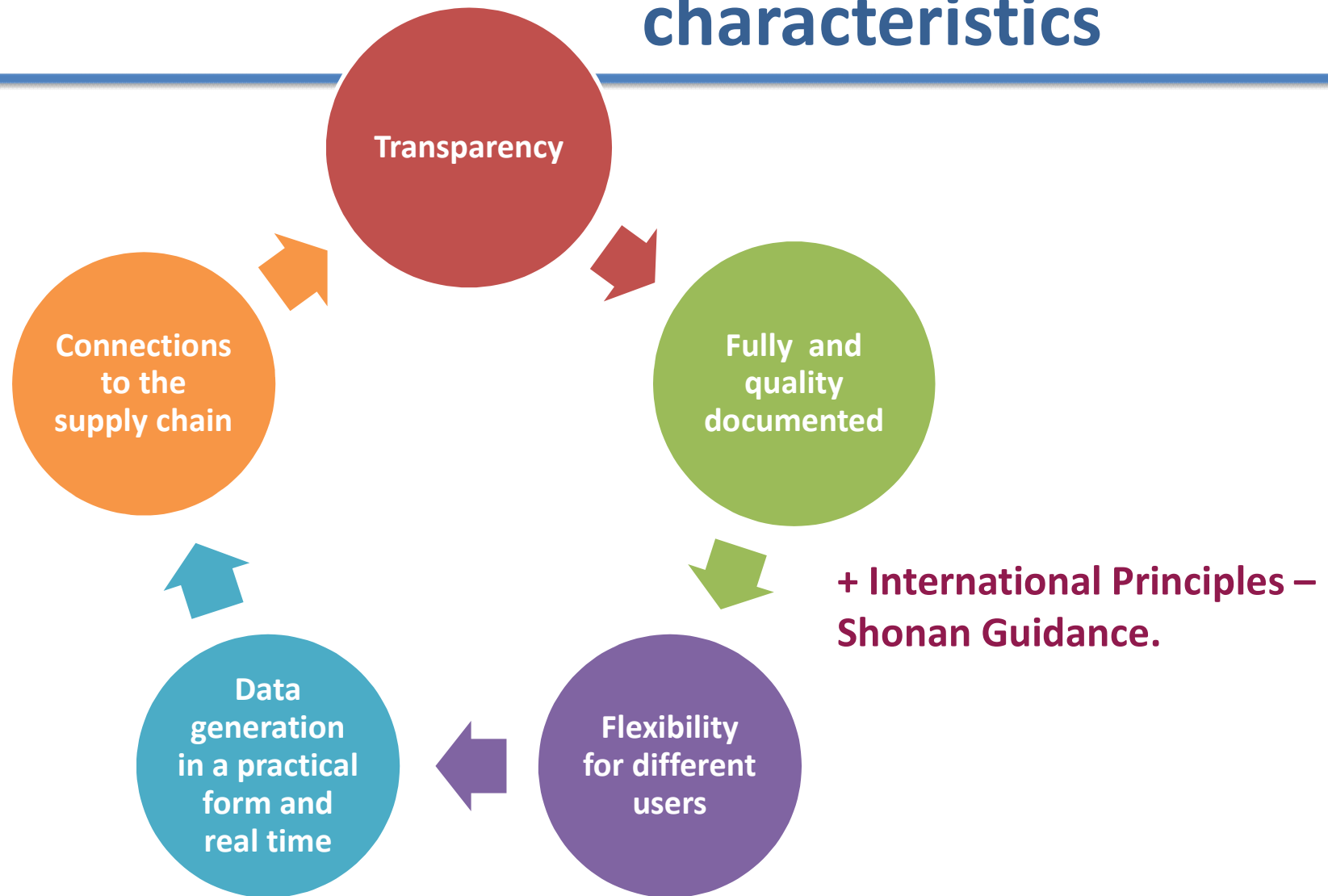
mexicaniuh

# Mexican LCI platform development timeline



# LCI database characteristics

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# Dataset documentation

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The dataset documentation is carried out through the following modules:

- Activity description
- Modeling and administrative





# Activity description

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## Module includes:

- Activity
- Classification
- Geography
- Technology
- Time period
- Scenario Macroeconomic
- Message

# Activity

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Contains the identifying information of an activity dataset including name and classification. It includes:

- Activity Name
- Type
- Type of dataset
- Technical description
- Quantitative Properties of the Product or Process
- Type of Quantitative Reference
- Functional Unit or Other
- Activity Type

# Dataset type

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- Data are always entered at the unit process level. The database-generated, linked, single-output datasets are available both at the **unit process level** and as **aggregated (terminated) system datasets**
- **Unit process level** : The unit process (UPR) is the smallest element considered in the life cycle inventory analysis for which input and output data are quantified. The database contains data on a unit process level that are in general neither vertically nor horizontally aggregated.
- **Aggregated (terminated) system**: The product systems include all upstream activity datasets, as linked by the intermediate exchanges, and therefore system datasets do not themselves have any intermediate exchanges, only environmental exchanges crossing the system boundaries.

# Quantitative properties of the product or process

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- Additional quantitative specifying information on the good, service or process in technical term(s): qualifying constituent(s)-content and / or energy-content per unit, etc. as appropriate. Separated by commas.
- Note: non-qualifying flow properties, CAS No., synonyms, chemical formulas, etc. are documented exclusively in the "Flow data set".

# Type of quantitative reference

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Reference to “Flow” data set. Reference to which the magnitude of the inputs and outputs in the process relates.

This can be:

- Reference flow(s)
- Functional unit
- Other parameter
- Product period

The name of the quantitative reference flow must be identical to the name of the unit process it is referencing.

# Functional unit or other

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- The **functional unit of a product system** is a quantified description of the performance requirements that the product system fulfils.
- In a **comparative study, the functional unit has to be the same for all the compared product systems.**
- After identifying the relevant market segment and the obligatory product properties, the **functional unit can be defined and quantified in terms of the obligatory product properties required** in the market segment.

# Activity Types

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The special activity types are:

- ordinary transforming activity (default)
- market activity,
- I/O activity,
- residual activity,
- production mix,
- import activity,
- supply mix,
- export activity,
- re-export activity, or
- correction activity.

# Activity Type: ordinary transforming activities

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- All activities that are not of these special types are **ordinary transforming activities**. Transforming activities are human activities that transform inputs, so that the output of the activity is different from the inputs, e.g. a hard coal mine that transforms hard coal in the ground to the marketable product hard coal.
- Transforming activities are **here understood in the widest possible sense**, including extraction, production, transport, consumption and waste treatment activities, i.e. **any human activity where the intermediate output is different from the intermediate input**.
- The concept 'transforming activities' is introduced here simply to distinguish the further modelling and linking of activities these 'ordinary' activities from the market activities, production and supply mixes, import and export activities, and correction datasets.



# Activity type: market activities

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- In contrast, market activities do not transform their inputs, but **simply transfer the intermediate output** from a transforming activity to the transforming activities that consume this intermediate output as an input, e.g. transmission of electricity.
- Market activities typically **mix similar intermediate outputs** from different transforming activities. Market activities therefore supply consumption mixes of the intermediate outputs.

# Classification<sup>(a)</sup>

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Contains classification pairs to specify the activity.

Two types of classification should be introduced to achieve compatibility with the ILCD and Ecospol formats

- The class that the activity belongs to within the specified classification system.
- Two levels of first and second classification are used.
- For ecospol, all activities are classified according to the International Standard Industrial Classification (ISIC), a classification system provided by the United Nations, with some additional subdivisions. This **classification is used to identify the responsibleecoinvent editor**. New, optional classification systems can be added on request to the ecoinvent database administrator

<sup>(a)</sup> Note that classification, as used here in data management, differs from the use of the term in LCIA.

# Classification: Ecospold

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## ecoinvent codes description

19a	Liquid and gaseous fuels from biomass
2011a	Manufacture of nuclear fuels and 2420a Smelting and refining
2710a	Manufacture of electric motors, generators, for liquid fuels
2811a	Manufacture of engines and turbines for liquid fuels, except
2815a	Manufacture of furnaces and boilers for liquid fuels
2815b	Manufacture of permanent mount non-electric household heating
3011a	Construction of drilling platforms
3510a	Electric power generation based on liquid fuels,
3510b	Electric power generation, photovoltaic,
3510c	Electric power generation, wind
3530a	Steam and air conditioning supply based on liquid fuels,
3530b	Solar collectors operation
4100a	Construction of factory buildings for the metal industry,
4220a	Construction of utility projects for electricity production,
4220b	Construction of utility projects for electricity production,
4290a	Construction of infrastructure for petroleum refining and di
4322a	Installation of solar collector systems

Source: <http://www.ecoinvent.org/support/faqs/data-providers-and-ecoeditor/what-is-the-isic-classification-field-for-to-which-isic-classification-code-does-my-dataset-belong.html>

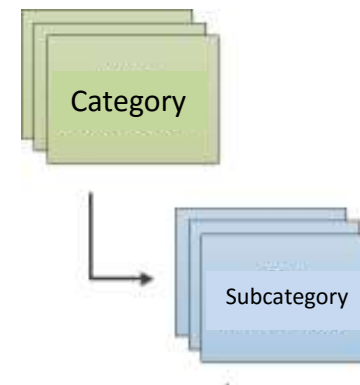
# Classification: ILCD

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Uses category and subcategory designations

Example:

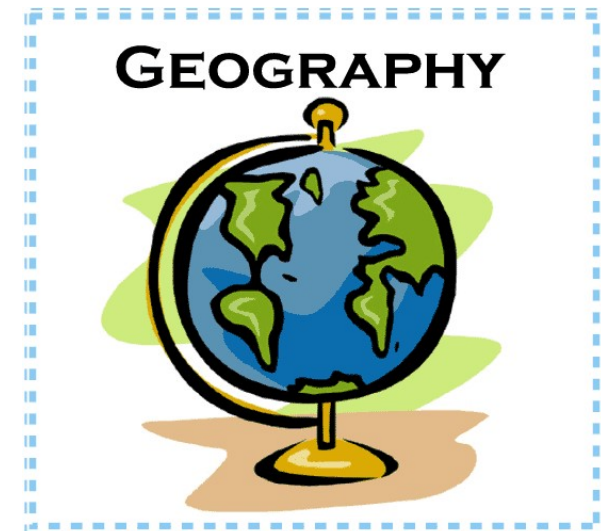
- Category: Energy carriers and technology
- Subcategory: Energetic raw materials, Electricity, Heat and steam, Mechanical energy, etc.



# Geography

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- The geographical location indicated is the location for which the dataset is intended to be valid.
- For markets (consumption mixes) containing several located activities, the geography describes the market boundaries, across which imports and exports are limited.



# Technology

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- The technology of the described activity.



Technology level



**The technology level of a transforming activity is classified into one of these five classes:**

- “New” for a technology assumed to be on some aspects technically superior to modern technology, but not yet the most commonly installed when investment is based on purely economic considerations.
- “Modern” for a technology currently used when installing new capacity, when investment is based on purely economic considerations (most competitive technology).
- “Current” for a technology in between modern and old.
- “Old” for a technology that is currently taken out of use, when decommissioning is based on purely economic considerations (least competitive technology).
- “Outdated” for a technology no longer in use.

# Time parameters

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## Time period

The time period is the time period for which the dataset is intended to be valid.

## Start of Period

- Start date for the time period that the data represent.

## End of Period

- End date for the time period that the data represent.

# Modeling and administrative indicators

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## Includes:

- Representativeness
- Review
- Data entered by
- Data generator and publications



# Representativeness

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- **Includes...**

- Activity Name
- Classification
- Type of Modeling
- LCI Method Principle
- Deviation of the modeling
- Sampling rate
- Sampling Procedure
- Extrapolation

- Comment on type of modeling and extrapolation
- Type of assignment
- Deviations from LCI type of assignment / explanations:
- Constants used in the modeling and deviation of the constants used
- Criteria count and cutting deviation criteria
- Principles of selection and consistency of data sources
- Deviation from data selection and combination principles explanations
- Advice for users
- Data integrity

# Modeling conditions

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- The system model describes how activity datasets are linked to form product systems.
- Unlinked unit processes, as supplied by data providers, always have an undefined system model.
- A specific system model, e.g. allocation by true value, with corrections for carbon, average current suppliers', is added by the database service layer, when applying the specific linking rules for this system model.

# Type of modelling

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- Undefined
- Allocation by true value, with corrections for carbon, average current suppliers
- Allocation by carbon, average current suppliers
- Attributional, average current suppliers, individual allocation
- Allocation by dry mass, average current suppliers
- Allocation by revenue, average current suppliers
- Substitution, constrained markets and technologies
- Substitution, constrained supplies of by-products
- Manually linked



# LCI method principle

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- LCI method principle followed in the product system modelling, i.e.
  - regarding using average data (→ attributional = non-marginal) or
  - modelling effects in a change-oriented way (→ consequential = marginal)
    - Attributional
    - Consequential
    - Consequential with attributional components
    - Not applicable
    - Others

# Type of assignment

---

- Partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems.
- An allocation property is a property used for calculating allocation factors. The master allocation property is applied for all exchanges of the dataset except when a specific allocation property is available/specified for the exchange.
- For all the current system models using allocation, the allocation properties are added centrally by the database service layer during their calculation, overriding any entry in this field.

# Type of allocation

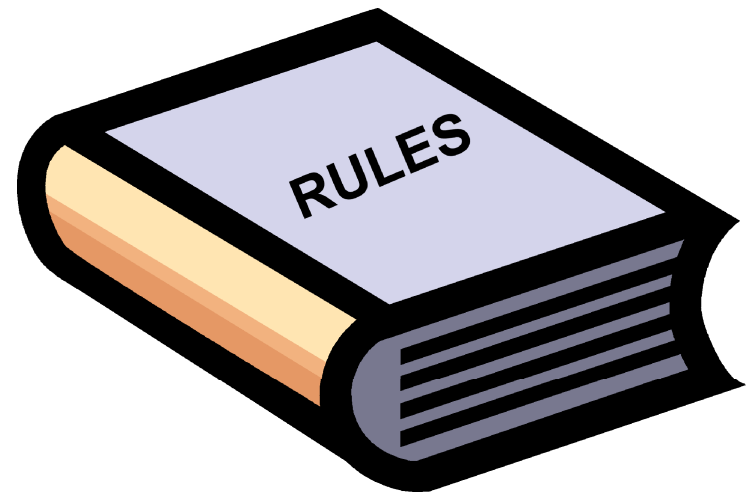
---

- Allocation - 100% to main function
- Allocation - physical causality
- Allocation - market value
- Allocation - gross calorific value
- Allocation - net calorific value
- Allocation - exergetic content
- Allocation – mass
- Allocation - equal distribution
- others

# Criteria count

---

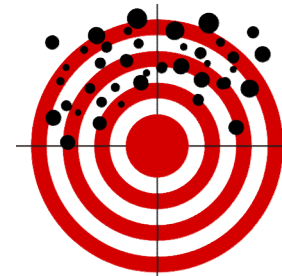
- Principles applied in data collection regarding completeness of (also intermediate) product flows , waste flows, and elementary flows.
- Examples are: cut-off rules; systematic exclusion of infrastructure, services or auxiliaries, etc.; systematic exclusion of air in incineration processes, cooling water, etc.



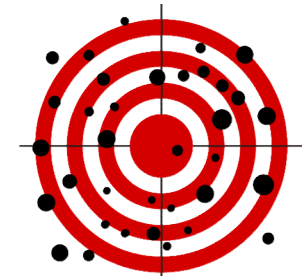
# Principles of data selection and sources consistency

---

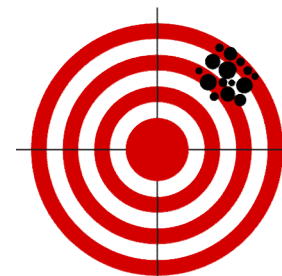
- Principles applied in data selection and in combination of data from different sources.
- Includes brief discussion of consistency of data sources regarding the data values, modelling, and appropriateness.
- In case of averaging: principles and data selection applied in horizontal and/or vertical averaging.



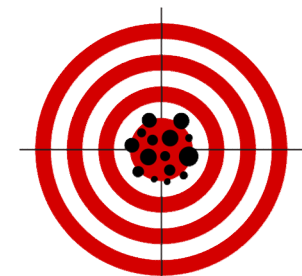
Unreliable & Invalid



Unreliable, But Valid



Reliable, Not Valid



Both Reliable & Valid



# Dataset integrity

---

- Completeness of coverage of relevant product, waste and elementary flows.
- For LCI results and partly terminated systems, this means throughout the underlying product system model.
- "Relevant" refers to the overall environmental relevance, i.e. for unit processes including the upstream and downstream burdens of product and waste flows.

## Can be edited in the following ways:

- all relevant flows quantified
- relevant flows missing
- topic not relevant
- no statement

- ...the ...



# Last revision – date and type

---

Date on which the dataset was last reviewed

## Type of Revision

- Dependent internal review
- Independent internal review
- Independent external review
- Accredited third party review
- Independent review panel
- Not reviewed

# Data quality indicators

---

- **Data quality indicators** serve to provide the reviewed key information on the dataset in a defined, computer-readable (and hence searchable) form. This serves to support LCA practitioners to **identify/select the highest quality and most appropriate data sets**.
- **Indicator Names**: completeness, geographical representativeness, methodological appropriateness and consistency, overall quality, precision, technological representativeness, time representativeness
- **Allowable Values**: Very good, Good, Fair, Poor, Very poor, Not evaluated/unknown, Not applicable

# Nomenclature, methodology, review/verification, documentation/reporting and quality compliance

---

Compliance of this dataset with the respective requirements set by the "compliance system" referred to.

The following designations can be used:

- fully compliant
- not compliant
- not defined



# Data entered by

---

## Includes:

**Contact data:** "Contact data set" of the commissioner / financing party of the data collection / compilation and of the dataset modelling. For groups of commissioners, each single organisation should be named. For data set updates and for direct use of data from formerly commissioned studies, also the original commissioner should be named.

**Intended Applications:** Documentation of the intended application(s) of data collection and data set modelling. This indicates / includes information on the level of detail, the specificity, and the quality ambition in the effort.

# Data generator and publications

---

- Contains information about who collected, compiled or published the original data.
- May or may not be the same person as under 'DataEntryBy'.
- Furthermore, contains information about kind of publication underlying the dataset and the accessibility of the dataset.

## Includes--

- Contact data
- Dataset version
- Permanent data set URL
- Copyright protected
- Registration number
- License type
- Access and use restriction

# Copyright protection and others

---

- Indicates whether or not a **copyright exists**. Should be ticked “Yes” by default, except for sponsored datasets.
- **Registration number**: registration number assigned to the dataset
- **Access and use restriction**: possible access restrictions for the dataset.
- **License type**: indicates the type of license





# Exchanges

---

- When you are going to introduce the exchanges to conform the dataset, you must first consider clearly establishing the relationship between the different activities, establishing an order for the introduction of the data.
- This means that if you are going to enter a dataset that contains other activities, you must first edit these (aggregation ).



Third	Second	First
Electricity Mix, Peru	Electricity, by diesel	Waste treatment Construction of facility
	Electricity, combined cycle by gas	Waste treatment Construction of facility
	Electricity, conventional gas	Construction of facility
	Electricity, hydro	Construction of facility
	Electricity, wind	Construction of facility

# Exchanges

---

- Flow Type
- Name
- Amount
- Unit
- Database
- Compartment

# Flow Type

---

- **Flow Type:** intermediate or elementary
- **Input:** from environment for elementary flows or From Technosphere (unspecified) for intermediate flows
- **Output:** Reference Product or By-product for intermediate flows
- **Output:** to environment for elementary flows



# Elementary Flows

---

- Elementary Flows: exchanges from and to the environment
- Exchanges from the environment are resources extracted and chemical reactants from the air (e.g. CO<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub>), water or soil that enter into a human activity or into biomass harvested in the wild.
- Also, land transformation, land occupation, and working hours are recorded as exchanges from (services provided by) the natural, social or economic environment.
- Exchanges to the environment are emissions to the different environmental compartments (e.g., air, water).

# Database

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- Create a new exchange or use one of the databases contained in the software

## **Databases:**

- Ecoinvent
- ELCD
- Needs
- Bioenergiedat
- USDA\_crop\_data\_1\_1
- Undefined
- Mexicaniuh

# Create intermediate flow

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- **Name:** Name of the intermediate flow. Names of intermediate exchanges are spelled with lower case starting letter, i.e. 'lime', not 'Lime'.
- **Variable Name (exchange):** The variable name is a short name for this exchange, used when referring to this exchange in mathematical relations (formulas). This variable name will be used as a default variable name for all instances of the exchange.
  - Variables may contain characters, numbers and underscores (\_). Variable names must start with a character (a-z).
  - Variable names are not case sensitive (calorific\_value equals Calorific\_Value).
- **CAS-Number:** Indicates the number according to the Chemical Abstract Service (CAS). The Format of the CAS-number is 000000-00-0 where the first string of digits needs not to be complete (i.e. less than six digits are admitted).

# Create intermediate flow

---

- **Unit:** As far as practical, SI-units are applied, with the SI-prefixes (h, k, M, G, T, P).  
Exceptions are:
  - The traditional measure “ton”, with the specification metric ton (= 1000 kg = 1 Mg), when used in the combination metric ton\*km.
  - The traditional area measure ar (a), as in hectare (ha), which should not be confused with the SI-prefix atto- or the popular, Latin abbreviation for year.
  - Popular units for time (year, month, week, day, hour), written out fully, since multiples of the SI-unit seconds (s) appears awkward.Units are always in English.
- **Comment (exchange):** A general comment can be made about each individual exchange. This will appear as a default entry in the comment field of every instance of the exchange.
- **Classification:** Optional classification of the intermediate exchange.

# Amounts and Mathematical Relationships

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- The current value of the parameter. If the value can be calculated from a mathematical relation, this is indicated by a small fx in front of the value. The mathematical relation is shown and can be edited in a separate field.
- Mathematical relations (formula) can include references to values of flows, parameters or properties by variable names or the REF function. The mathematical relation is documented in the adjoining comment field.



# Uncertainty

---

- Uncertainty information includes probability distribution functions and their parameters, and Pedigree Matrix data. The specific parameters depend on the probability distribution function.
- The choice of distribution has limited influence on the overall uncertainty of a product system, since the addition of a high number of independent variables, each with their distribution, will approach a result with a normal distribution.
- Additional uncertainty, based on data quality indicators, can be added automatically, but currently only when the normal and lognormal distribution functions have been selected.

# Pedigree Matrix

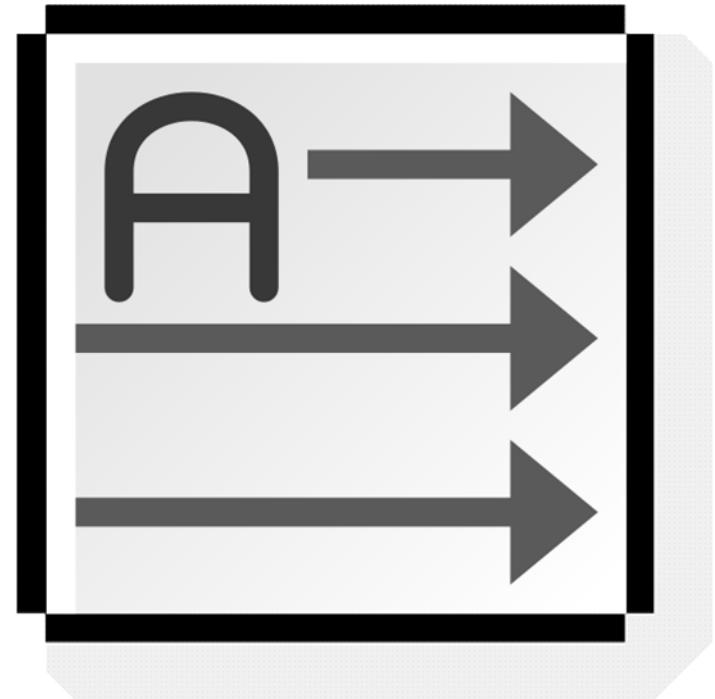
- Data quality indicators provides a qualitative assessment of data quality. This can be converted to a quantitative additional uncertainty, which can be added to the basic uncertainty.
- The pedigree matrix can be edited in Mexicaniuh.
- Source: Andreas Ciroth. Refining the pedigree matrix approach in ecoinvent: Towards empirical uncertainty factors. GreenDelta, 2013

Indicator score	1	2	3	4	5 (default)
<b>Reliability</b>	Verified <sup>3</sup> data based on measurements <sup>4</sup>	Verified data partly based on assumptions <b>or</b> non-verified data based on measurements	Non-verified data partly based on qualified estimates	Qualified estimate (e.g. by industrial expert)	Non-qualified estimate
<b>Completeness</b>	Representative data from all sites relevant for the market considered, over an adequate period to even out normal fluctuations	Representative data from >50% of the sites relevant for the market considered, over an adequate period to even out normal fluctuations	Representative data from only some sites (<<50%) relevant for the market considered <b>or</b> >50% of sites but from shorter periods	Representative data from only one site relevant for the market considered <b>or</b> some sites but from shorter periods	Representativeness unknown or data from a small number of sites <b>and</b> from shorter periods
<b>Temporal correlation</b>	Less than 3 years of difference to the time period of the dataset	Less than 6 years of difference to the time period of the dataset	Less than 10 years of difference to the time period of the dataset	Less than 15 years of difference to the time period of the dataset	Age of data unknown or more than 15 years of difference to the time period of the dataset
<b>Geographical correlation</b>	Data from area under study	Average data from larger area in which the area under study is included	Data from area with similar production conditions	Data from area with slightly similar production conditions	Data from unknown <b>or</b> distinctly different area (North America instead of Middle East, OECD-Europe instead of Russia)
<b>Further technological correlation</b>	Data from enterprises, processes and materials under study	Data from processes and materials under study (i.e. identical technology) but from different enterprises	Data from processes and materials under study but from different technology	Data on related processes or materials	Data on related processes on laboratory scale <b>or</b> from different technology

# Format compatibility options

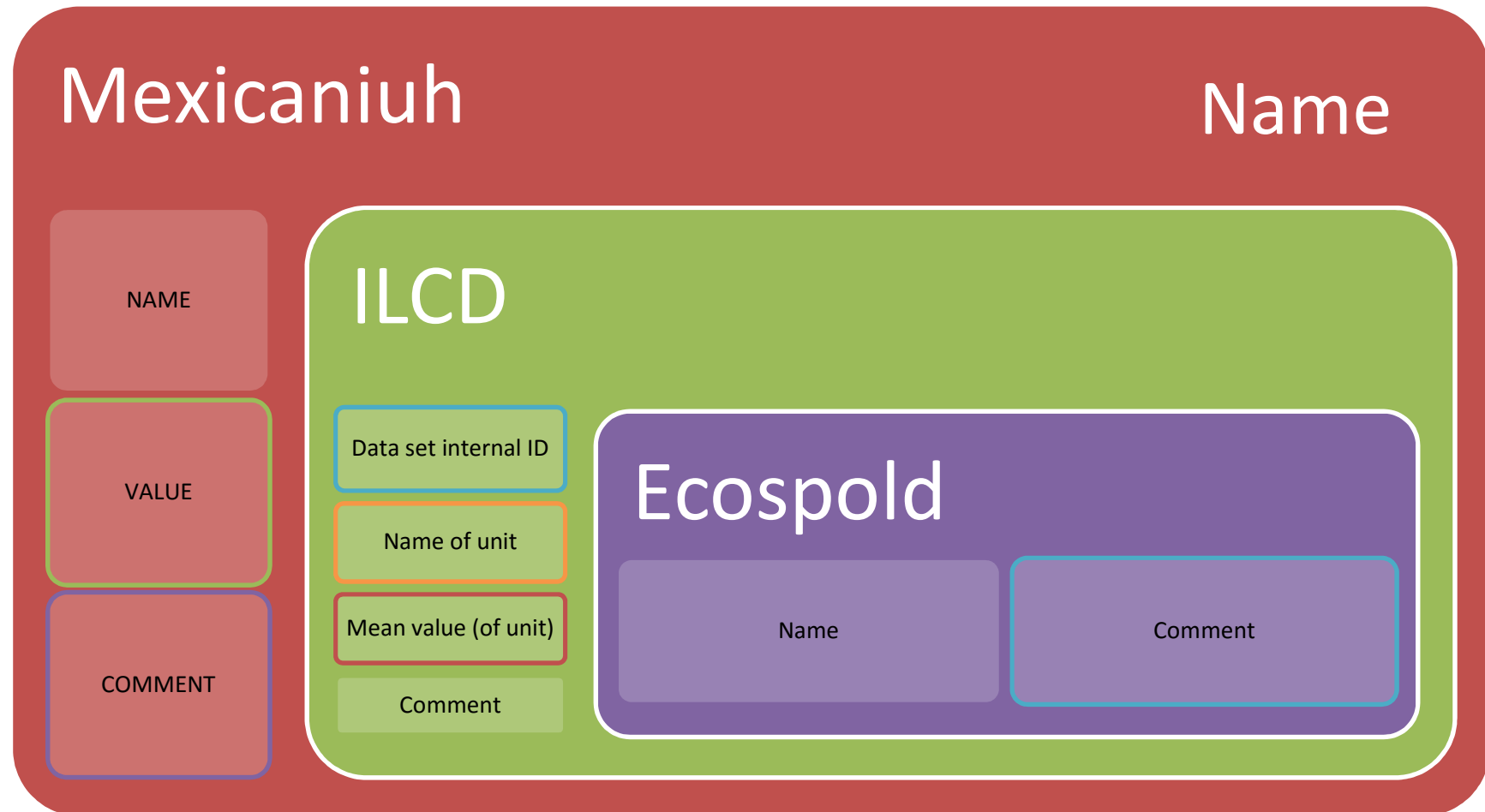
---

- 🔑 **Equivalent fields**
- 🔑 **Grouping**
- 🔑 **Both formats definition**



# Equivalent fields

---



# Grouping

Mexicanianuh

Geography

Latitude  
Longitude

Description,  
Municipality,  
Hydric stress  
index

ILCD

Sub-Location  
2 fields lat-  
long

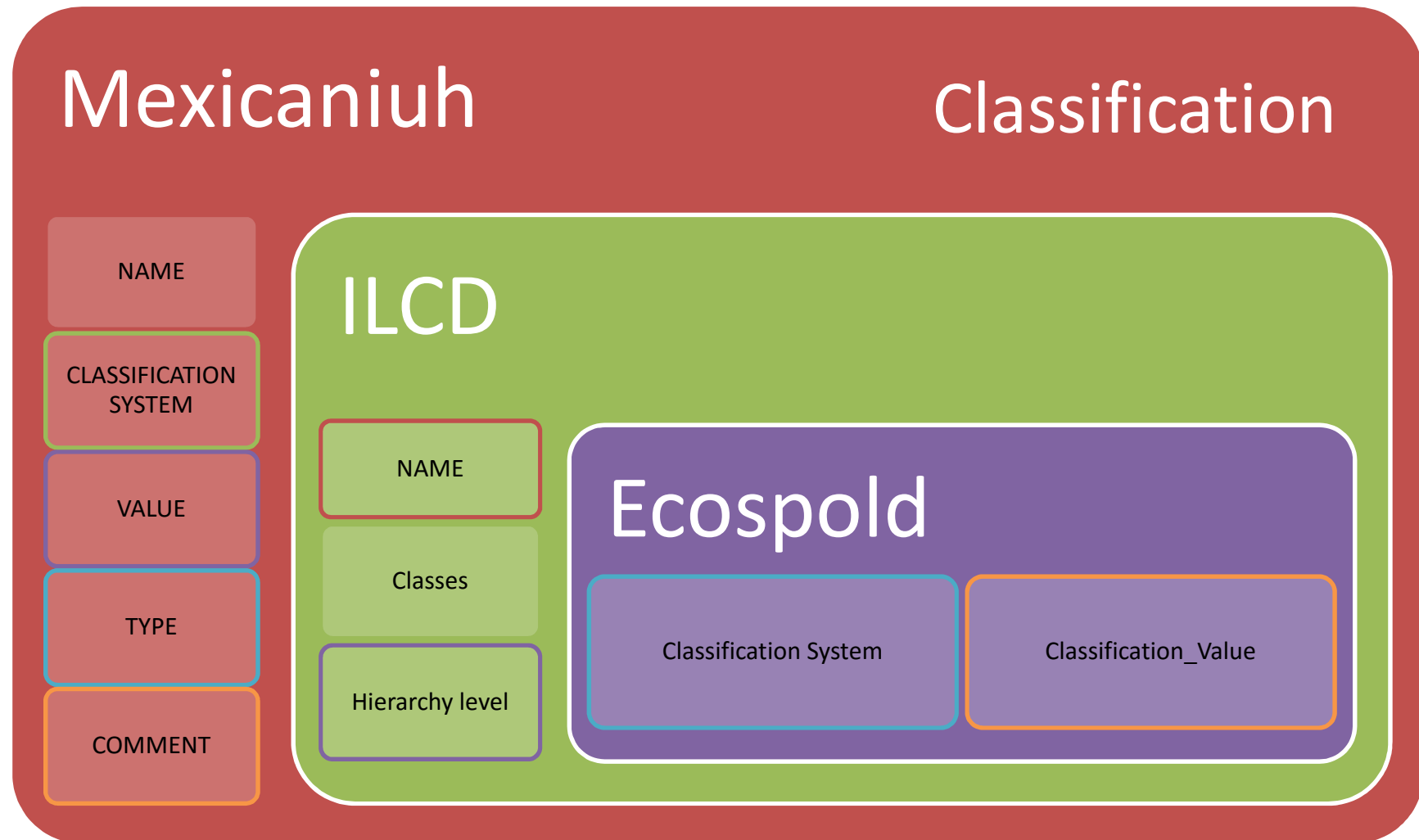
Impact  
location

Ecospold

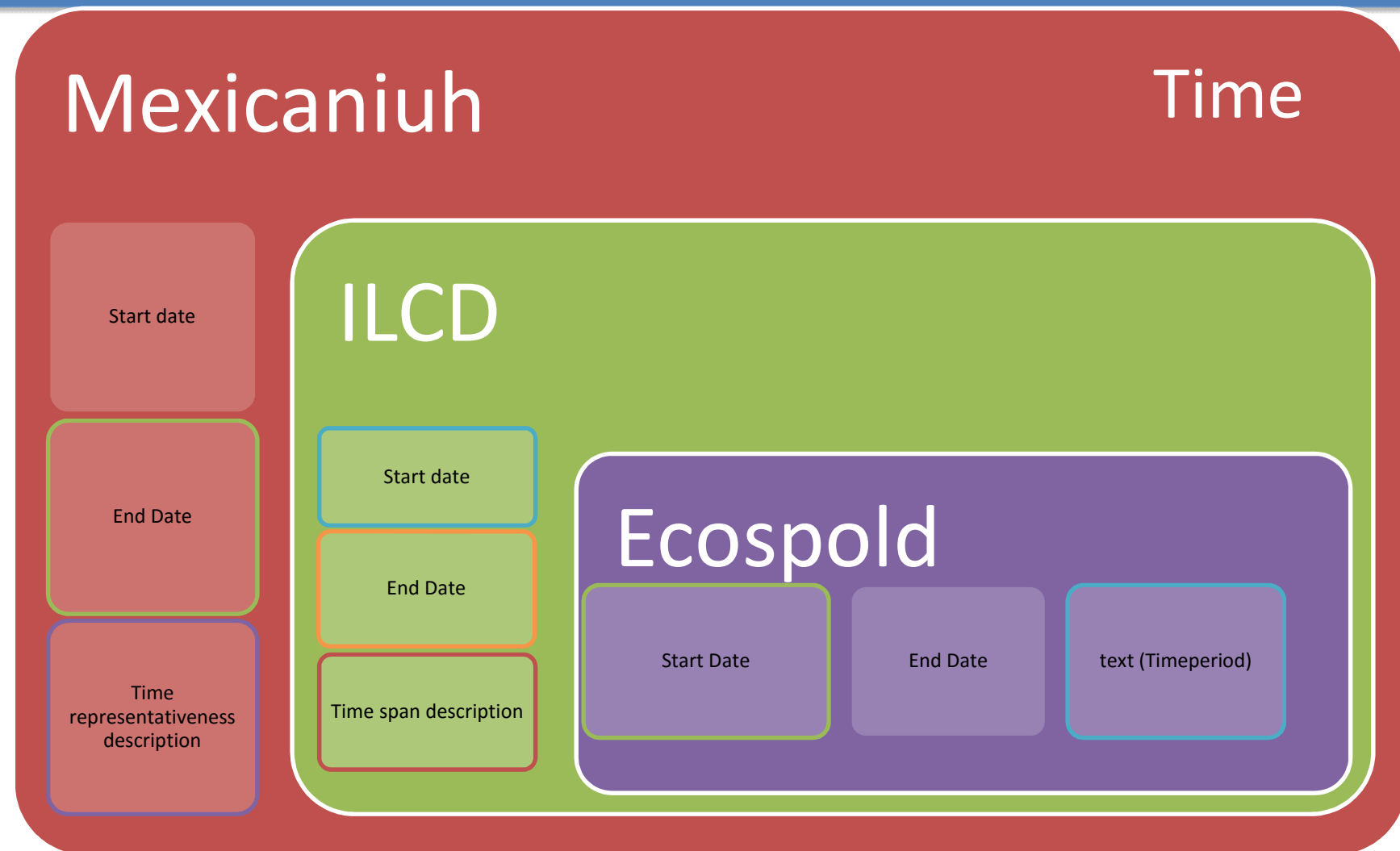
Shortname  
1 field lat-long

Name

# Both format definitions

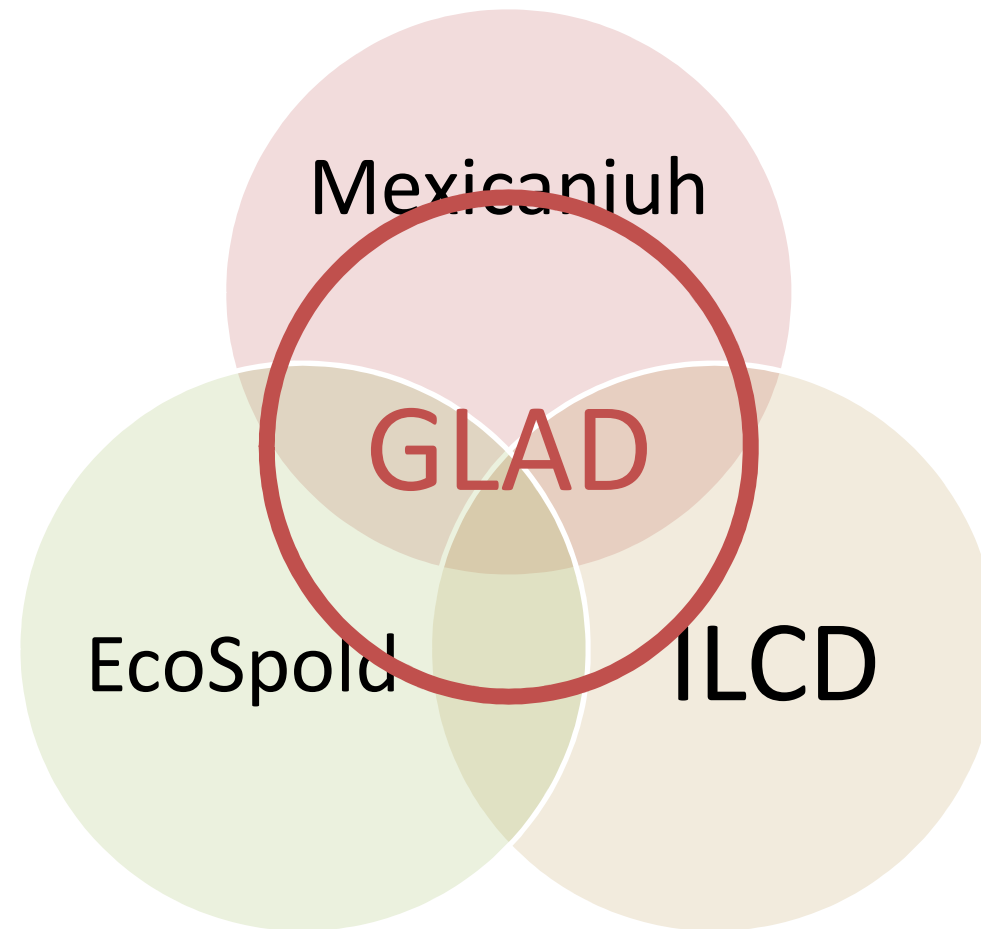


# Both format definitions



# Database fields intersection

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# Format

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- The platform allows to import / export through XML files to Ecospold and ILCD formats
- The Web application facilitates collaboration in the capture, revision and validation processes
- System security is managed through user profiles and password protection
- Compatible with most of the descriptors used in GLAD ( In revision)

ILCD & EcoSpold

ILCD



## Exercise: Concrete Block in MEXICANIUH

Insert concrete block dataset in MEXICANIUH web platform using the following information for documentation.

### Activity description

The product is a hollow concrete block made of cement, sand, gravel, and some additives. The dimensions of the block are: 40x20x15 cm and a piece has an average weight of 9.6 kg. This production process is an ordinary transforming activity type.

This dataset was created as a unit process using the results of an LCI developed for a LCA of social housing in Mexico.

The functional unit/reference flow used in this LCI was 1 piece (9.6 kg).

### Classification

This activity could be classified according to EcoSpold format as 2395: Manufacture of articles of concrete, cement and plaster. While in ILCD format could be classified as Material production in the top category and in the subcategory as others. Also in SimaPro could be classified as material (A), construction (B), and concrete (C).

### Geography

This dataset was generated with information collected in Puebla, Mexico. This state is in the center of the country (Latitude 19.1, Longitude -98.39).

### Technology

The technology used in the production process is current, which consists in Mixing of materials, extrusion, outdoors drying, and storage. The technical purpose of concrete blocks is to use them to build walls in social interest housing mainly.

### Time

The time period for which the dataset is intended to be valid is January 1st, 2008 December, 31th, 2007. Data represent production during 2007

### Scenario Macro-Economic

The macro-economic scenario considered is business as usual.

### Representativeness

Dataset modelling considers an average of current suppliers applying mass allocation procedure. Also, the LCI was developed with an attributional approach and none deviation to another type of modelling was reported.

Constants used in calculation are: sand density: 1581 kg/m<sup>3</sup>, gravel density: 1750 kg/m<sup>3</sup>. Deviation of these values may occur according site of extraction and composition.

To have Consistency of Data Sources data from companies and official sources was used.

It is important to advice to users that dataset represents the typical hollow concrete block used in central Mexico for social interest housing.

In terms of integrity it is possible to declare that all relevant flows were quantified.

### Review

A dependent internal review was conducted on January, 9<sup>th</sup>, 2009.

### Data generator and publication

Data has been published entirely in the following source:

Chargoy, A. J., Rosas, M. L. & Téllez, M. D. (2009). Generación de inventarios para el Análisis de Ciclo de Vida de cemento, block, bovedilla, vigueta y ladrillo en la zona centro de México. Universidad de las Américas Puebla, available at [http://catarina.udlap.mx/u\\_dl\\_a/tales/documentos/lamb/chargoy\\_a\\_jp/](http://catarina.udlap.mx/u_dl_a/tales/documentos/lamb/chargoy_a_jp/)

This dataset is intended to be free for all users of MEXICANIUH.

### Flows

The following table shows the name flows, amount, amount and database used in each input of the LCI.

Block, hollow, 40x20x15 cm, in plant, MX	9.6	kg	1 piece
Name	Amount	Unit	Database
tap water, at user	0.3550	kg	ECOINVENT
Sand, in extraction site, MX	0.0027	m <sup>3</sup>	MEXICANIUH
Gravel, in extraction site, MX	0.0026	m <sup>3</sup>	MEXICANIUH
Cement, production mix, in plant, MX	0.8200	kg	MEXICANIUH
hydrochloric acid, 30% in H <sub>2</sub> O, at plant	0.0010	kg	ECOINVENT
chemicals inorganic, at plant	2.0E-4	kg	ECOINVENT
transport, lorry 7.5-16t, EURO3	1.01	tkm	ECOINVENT
Electricity, production mix, at grid,	1.7E-4	MWh	MEXICANIUH



mexican<sup>iuhi</sup>

MX			
diesel, burned in building machine	0.1742	MJ	ECOINVENT

# Part 2 - Responsible Management Practices for LCA Databases

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## Concept and Criterias

Content from Bruce Vigon, Andreas Ciroth, Life Cycle Initiative, Regenerativa, CADIS.

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### Disclaimer

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# Contents

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1. Criteria background
2. Criteria
3. Example results

# Criteria background (1/3)

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Provide **actionable practices to manage and assess LCA databases**, giving users relevant information about quality, timeliness, security and other attributes of the database, and at the same time giving managers guidelines on how to administer them.



# Criteria background (2/3)

---

- 9 criteria:
  - **Qualitative description** of what is being addressed
  - **Quantitative score** - Similar to Pedigree Matrix
- 2 sets of evaluators:
  - **Internal evaluator** - Database manager and team
  - **External evaluator** - Another manager from another database
- 2 set of reviews:
  - **Internal review** - only database manager and its team
  - **Joint review** - Internal and external evaluator



# Criteria background (3/3)

---

1. Responsibility and Accountability.
2. Technical and methodological support.
3. Routines for consistent maintenance and updating.
4. Conforming documentation
5. Balance between continuity and innovation
6. Appropriate transparency
7. Secure storage
8. Harmonization of new approaches/datasets with existing
9. Commonly available data exchange interfaces

# 1. Responsibility and Accountability

---

## Question:

*Does the providing organization for the database have a **clear point of contact** to address user issues with data in the database in case of future problems?*

## Answers:

- 1 – Organization has provided a specific individual or individuals with their contact information for addressing user's issues and clear indication that customer support is available
- 3 – Organization has provided only a general or organizational contact, e.g. company email address
- 5 – Organization provides no particular information and user is forced to understand how to contact the organization.

## 2. Technical and methodological support

---

### Question:

*Does the responsible organization have the **technical and methodological resources and support available to respond to customer needs in a timely manner?***

### Answers:

→1 – Organization has a **Helpdesk** responding **within a day** to respond to customer needs by phone, email and social media.

→3 – Organization has technical and methodological resources and support available to respond to selected customer needs **within in a week by email only**<sup>(a)</sup>

→5 – No support is provided for inquiries

(a) Assessor may upgrade the score to a value of 2 if the organization provides more contact modes or faster response.

### 3. Routines for consistent maintenance and updating

---

#### Question:

*Does the database provider supply **clear instructions and standards to users to prevent errors and mistakes in the update procedure?***

#### Answers:

→ 1 – **Independently audited routines for quality assurance and review** are in place and supported by IT (electronic user guidance, FAQs, troubleshooting/error trapping, etc.)

→ 3 – **Applicable** (to current maintenance and upgrade tasking) **documented routines for quality assurance and review** are in place and supported by IT (electronic user guidance, FAQs, troubleshooting/error trapping, etc.)

→ 5 – Routines for quality assurance and review are in place described in a user manual<sup>(a)</sup>

(a) Assessor may upgrade the score to a 4 if the complexity of the manual is low and easy for users to apply.

## 4. Conforming documentation

---

### Question:

*Does the database provider **publish suitable documentation** conforming to the guidance principles to provide a basis for use of the database and to avoid misleading the customer?*

### Answers:

→1– (a) documentation is extracted/summarized into dataset fields, (b) data and information used is substantiated (sources, averaging, etc.), (c) modeling and other calculations are shown, if any, (d) dataset documentation is complete and clear, and (e) information is available on aggregated datasets (source data and aggregation rationale)

→3(a) – (a) documentation is mostly in attached files, (b) substantiation or calculation transparency is limited, (c) documentation has some gaps or is lacking in clarity, (d) aggregated dataset documentation is limited or missing

→1(\*) – (a) documentation is fully in attachments, (b) there is little or no substantiation or transparency, (c) documentation has major gaps (d) there is no documentation of aggregated datasets (a) Evaluator may upgrade scores, to 2 and 4, respectively, if only one or two aspects are deficient.

(\*) Evaluator may upgrade scores, to 2 and 4, respectively, if only one or two aspects are deficient

## 5. Balance between continuity and innovation

---

### Question:

*Does the provider **issue updates** at a frequency that keeps the data current but does not inhibit or slow down the work of users in their application?*

### Answers:

→1– Database is updated frequently (at least annually) on a published schedule concerning all relevant and significant technology aspects and standard method improvements and updates to existing user databases are semi-automatic (and not affecting application use)

→3– Database is updated infrequently (2+ years) concerning only selected technologies or method aspects and/or updates have to be done manually (which can affect application usage)

→5– Database is updated rarely or not at all (no versioning) and concerning a single technology or method aspects and updates have to be done manually

## 6. Appropriate Transparency

---

### Question:

*Does the providing organization **give a level of transparency in the datasets as requested by users yet still respects the confidentiality requirements of datasets that contain sensitive information?***

### Answers:

- 1 – Fully transparent documentation (including provision of data of disaggregated processes) of the modeling and data for the reviewer and user
- 3 – Aggregated datasets for a group of activities with fully transparent documentation of the modeling and source data for the reviewer(s) and a verification statement regarding the review
- 5 – Aggregated datasets without documentation or a reviewer statement

# 7. Secure Storage

---

## Question:

*Are the mechanisms in place to **prevent unintended loss or accidental distribution of data content**?*

## Answers:

→1 - Database is stored on specific server, with limited and controlled access rights<sup>(a)</sup> to suitable persons and the content is automatically backed-up frequently - based on independent 3rd party assessment, or database is ISO 27000 certified

→3 - Database is stored on specific server, with limited and controlled access rights, to suitable persons and redundant backup - as self-declared

→5 - Database is stored without controls or no information is provided

(a) Means access through a password, link encrypted, etc.



## 8. Harmonization of new approaches/datasets with existing

---

### Question:

*When the database is expanded, does the managing organization take **all necessary steps to facilitate harmonization of new with existing content?***

### Answers:

→ 1 - All three of the following exist, **(i) quality guidelines for establishing datasets** that are in accordance with the existing datasets, **(ii) a clearly defined data format** to upload, store the information into the database, and **(iii) a review organization/structure** that is checking that a new dataset actually fits into the existing database (i.e. is compliant with the quality guidelines of the database, with a comprehensive documentation for the first element (i.e. quality guidelines) and the third element (i.e. the review) is done by an independent party

→ 3 – All three issues exist (above), with the review done internally only

→ 5 – The first two issues exist (above), review process is not defined or is unclear

## 9. Commonly available data exchange interfaces

---

### Question:

*Are the database contents suitable for exchange via standard interfaces into other software or systems? Have the contents been harmonized in order to avoid misunderstandings, misinterpretations and unintended inconsistencies?*

### Answers:

→ 1 - Interfaces for more than two different common electronic formats exist

→ 3 - Interfaces for two different common electronic formats exist

→ 5 - Interfaces for only one common electronic formats exist or formats are unique to database (i.e. non-standard)

.

# Evaluation example -

## Responsibility and Accountability

---

Database	AusLCI	Ecobase (Chile LCI)	Thailand National LCI Database
<b>Practice</b>	Personal emails provided see <a href="http://auslci.com.au/index.php/Contact">http://auslci.com.au/index.php/Contact</a> as well as phone number.	The excel spreadsheet contains a message to contact the developers (Cristian Emhart or Cristobal Loyola), and gives their emails, if any question or problem arises during the calculator usage.	Personal contact information provided in: <a href="http://www.thailcidatabase.net/index.php/menu-aboutus/menu-contacts">http://www.thailcidatabase.net/index.php/menu-aboutus/menu-contacts</a>
<b>Score</b>	<b>1</b> – Organization has provided a specific individual or individuals with their contact information for addressing user’s issues and clear indication that customer support is available		

# Evaluation example - Commonly Available Interfaces for Data Exchange

---

Database	AusLCI	Ecobase (Chile LCI)
<b>Practice</b>	Data sets are provided in SimaPro and Open LCA as a database, and in EcoSpold 2 and Open LCA spreadsheets on the AusLCI website.	There is no standard right now for the database, as it is currently stored in an Excel spreadsheet.
<b>Score</b>	<p>1</p> <p>Interfaces for more than two different common electronic formats exist</p>	<p>5</p> <p>Interfaces for only one common electronic formats exist or formats are unique to database (i.e. non-standard)</p>

# Evaluation example - Appropriate Level of Transparency

---

Database	AusLCI	Thailand National LCI Database
<b>Practice</b>	Many parameterized processes with exceptional transparency. (e.g. <a href="http://www.auslci.com.au/datasets/xml_viewer.php?LCIcode=AUSLCIUPX58169a34c472d.XML">http://www.auslci.com.au/datasets/xml_viewer.php?LCIcode=AUSLCIUPX58169a34c472d.XML</a> )	Gate-to-Gate information provided to reviewers as user request, (aggregated) data will be given in case of no confidentiality agreement
<b>Score</b>	<p><b>1</b></p> <p>Fully transparent documentation (including provision of data of disaggregated processes) of the modelling and data for the reviewer and user</p>	<p><b>3</b></p> <p>Aggregated datasets for a group of activities with fully transparent documentation of the modeling and source data for the reviewer(s) and a verification statement regarding the review</p>

# Part 2a - Responsible Management Practices for LCA Databases

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## Training exercise

Content from Bruce Vigon, Andreas Ciroth, Life Cycle Initiative, Regenerativa, CADIS.

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# Agenda

---

1. Part 1: Assess the USLCI database against the criteria
2. Part 2: Assess the proposed Peruvian Database management practices (not uploaded to Helpdesk)
3. Learning uptake (self-evaluation)

# Part 1: LCA Commons Data Repository - management practices assessment

---

## Instructions:

- Divide into groups of 3-5 people.
- Read the description of the practices of the U.S. LCA Data Commons database.
- Select 3-5 criteria, evaluate and justify.



## Part 2: Assessing proposed Peruvian RMP (not uploaded)

---

### Instructions:

In the same groups,

- Use same criteria selected in Part 1
- Write down the currently proposed management practices, evaluate them and justify
- If the score is higher than 1, what are the next feasible steps to improve it?

# Discussion/self-learning

---

**Instructions:** Choose one person of each group to present briefly the results of each part.

- Which difficulties did you encounter?
- What lessons can you extract from the exercise in order to improve RMP practices in the Peruvian database?
- Q&A

## Training in Life Cycle Assessment Data Bases: Work Exercise on Responsible Management Practices

### Description: U.S. LCA Data Commons<sup>(1)</sup>

The U.S. LCI database is maintained by the U.S. Government NREL/USDA which are government agencies. Due to the constant rotation of staff, it has a web page of contact with a form where users can send questions, methodological, or require technical support. The questions are usually answered within a period of 48 hours - no personal contact information is given.

The database is currently implemented in its first version to manage submissions of information from sources external to the Government and be submitted to a review of quality and editorial process. The information would be incorporated after quality assurance. The system was recently tested with the first batch of non-governmental inventories, and is in the process of evaluation and improvement. It is expected that from now on a database update would occur at least once a year, depending on the new processes that are provided. However, there is no formal agenda for this purpose. These processes must respect the methodological guidelines already existing, describing the required documentation, nomenclature, and must undergo a review process to ensure compliance with current standards. The data can be uploaded and downloaded, in various formats, including ILCD.

Documentation for each set of data available can be found on its web site, finding the description of their technology, period of reference, category, and flows into the fields in the dataset; Some streams have explanatory comments of their origin and aggregate datasets are not accepted. Calculations and flow diagrams are usually not present in the dataset, but rather through methodological reports which are available on the web site, where you can see specific processes of calculations, which adhere to ISO standards and guidelines and conforming to rigorous and transparent ILCD requirements.

The set of data are stored in government servers, following strict protocols implemented by the US Government. These are backed up daily, with restricted access.

## Capacitación en Bases de Datos de Ciclo de Vida

### Taller de *Responsible Management Practices*

#### **Descripción U.S. LCA Data Commons**

La base de datos U.S. LCI es mantenida por la agencia de gobierno estadounidense NREL/USDA con información gubernamental. Debido a la constante rotación de personal, posee una página web de contacto con un formulario donde los usuarios pueden enviar preguntas generales, metodológicas, o requerir soporte técnico. Las preguntas son contestadas generalmente en un plazo de 48 horas – ninguna información personal de contacto es entregada.

Actualmente, la base de datos se encuentra implementado su primer sistema para gestionar envíos de información de fuentes externas al gobierno y someterlas a una revisión de calidad y proceso editorial. La información sería posteriormente incorporada. El sistema fue recientemente probado con el primer lote de inventarios no gubernamentales, y se encuentra en proceso de evaluación y mejoramiento. Se espera que de ahora en adelante la base de datos se actualice por lo menos una vez al año, dependiendo de los nuevos procesos que sean suministrados, sin embargo, no existe una agenda formal para ello. Estos procesos deben respetar los lineamientos metodológicos ya existentes, describiendo la documentación requerida, nomenclatura, y deben someterse a un proceso de revisión para asegurar conformidad con los estándares actuales. Los datos pueden ser cargados y descargados, en varios formatos, incluyendo ILCD.

Documentación para cada set de datos disponible puede ser encontrada en su sitio web<sup>1</sup>, encontrándose la descripción de su tecnología, período de referencia, categoría, y flujos en los campos del dataset; algunos flujos poseen comentarios aclaratorios de su procedencia y no se aceptan datasets agregados. Cálculos y diagramas de flujo no suelen estar presentes en el dataset, pero sí a través de informes metodológicos que están disponibles en el sitio web, donde se pueden ver procesos específicos de cálculos, los cuales se adhieren a las normas ISO y lineamientos ILCD de manera rigurosa y transparente.

Los set de datos son almacenados en servicios gubernamentales, siguiendo los estrictos protocolos implementados por el gobierno estadounidense. Éstos son respaldados diariamente, con acceso restringido.

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<sup>1</sup> <https://uslci.lcacommons.gov/uslci/search>

# Part 3 - Set-up and Operation of Online Database and Portals

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Content from Reynaldo Felix and Juan Pablo Chargoy, CADIS

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**Disclaimer**

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

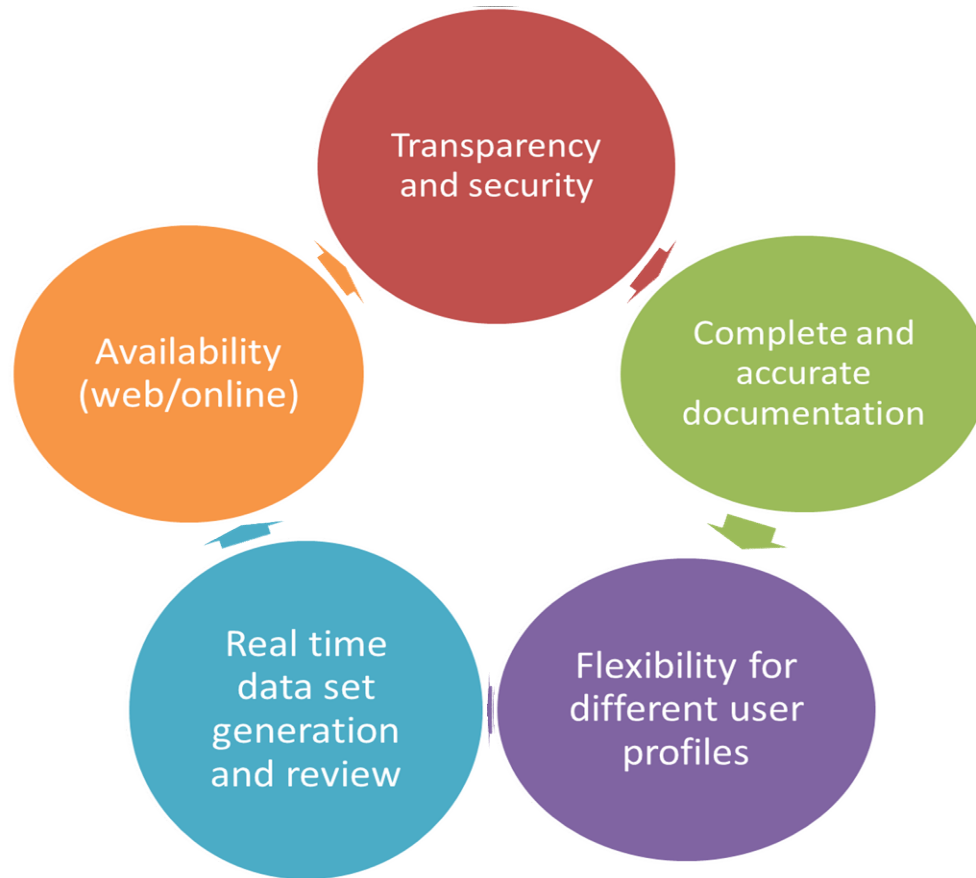
# Setup and Operation of Online Databases and Portals - Contents

---

- LCI System Characteristics
- Online and Web based Systems
  - ✓ Programming languages
  - ✓ Development frameworks
- Online and Web-based Systems Security
- Data protection and confidentiality
- User profiles (Author, Reviewer, Data provider), DB administration
- Dataset development phases: Data input, Review, Publishing
- Support databases availability
- Dataset searching criteria
- Compatibility with LCA software

# LCI System Desirable Characteristics

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## System development

- Web-based or online?
- Programming language
- Development framework
- Database manager

# Online and Web-based Systems

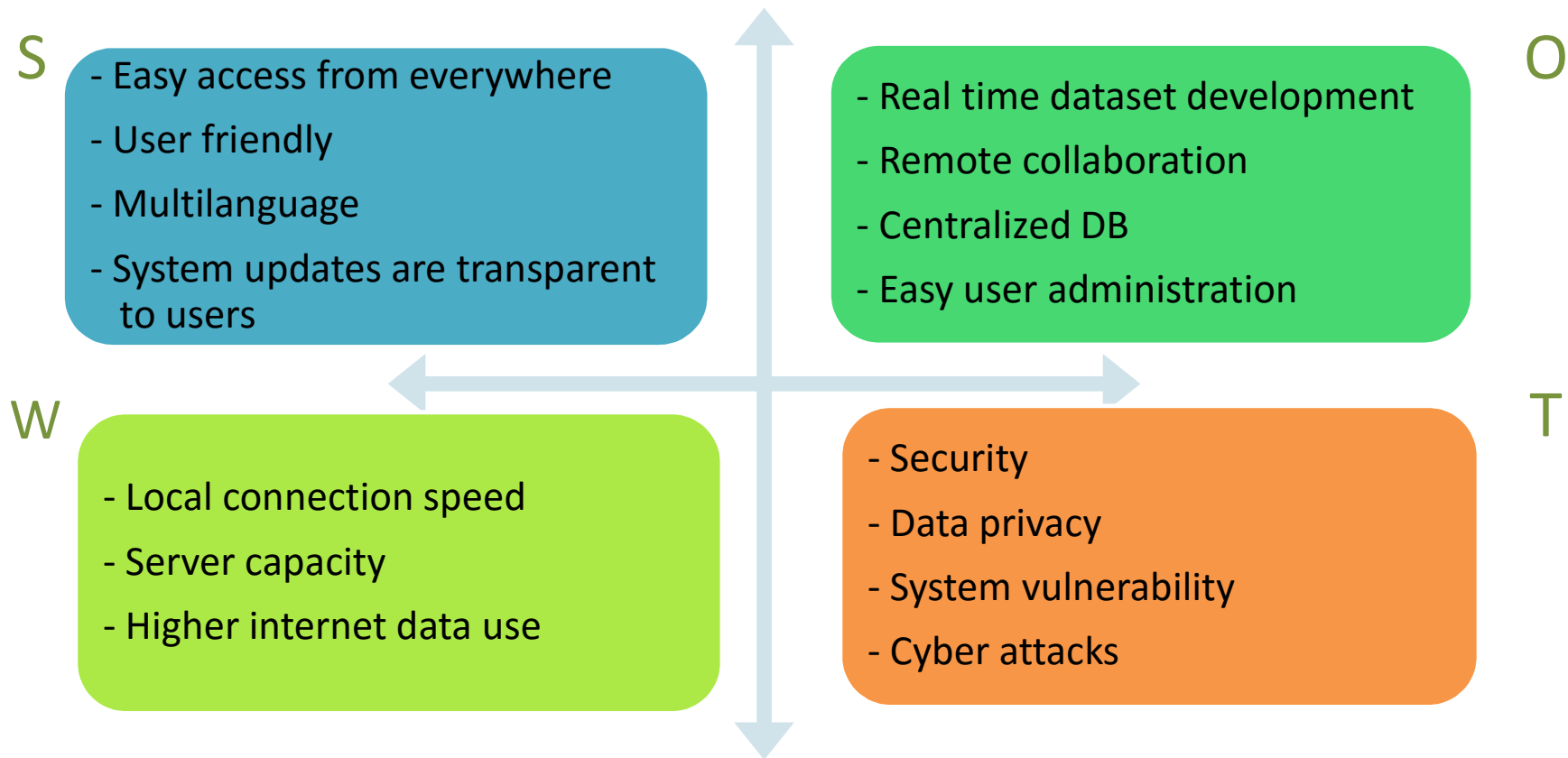
---

- A **web-based system** runs from a browser, on an outside server using the Internet.
- An **online system** uses an Internet connection to access the information it needs. It doesn't necessarily need to make use of a browser.

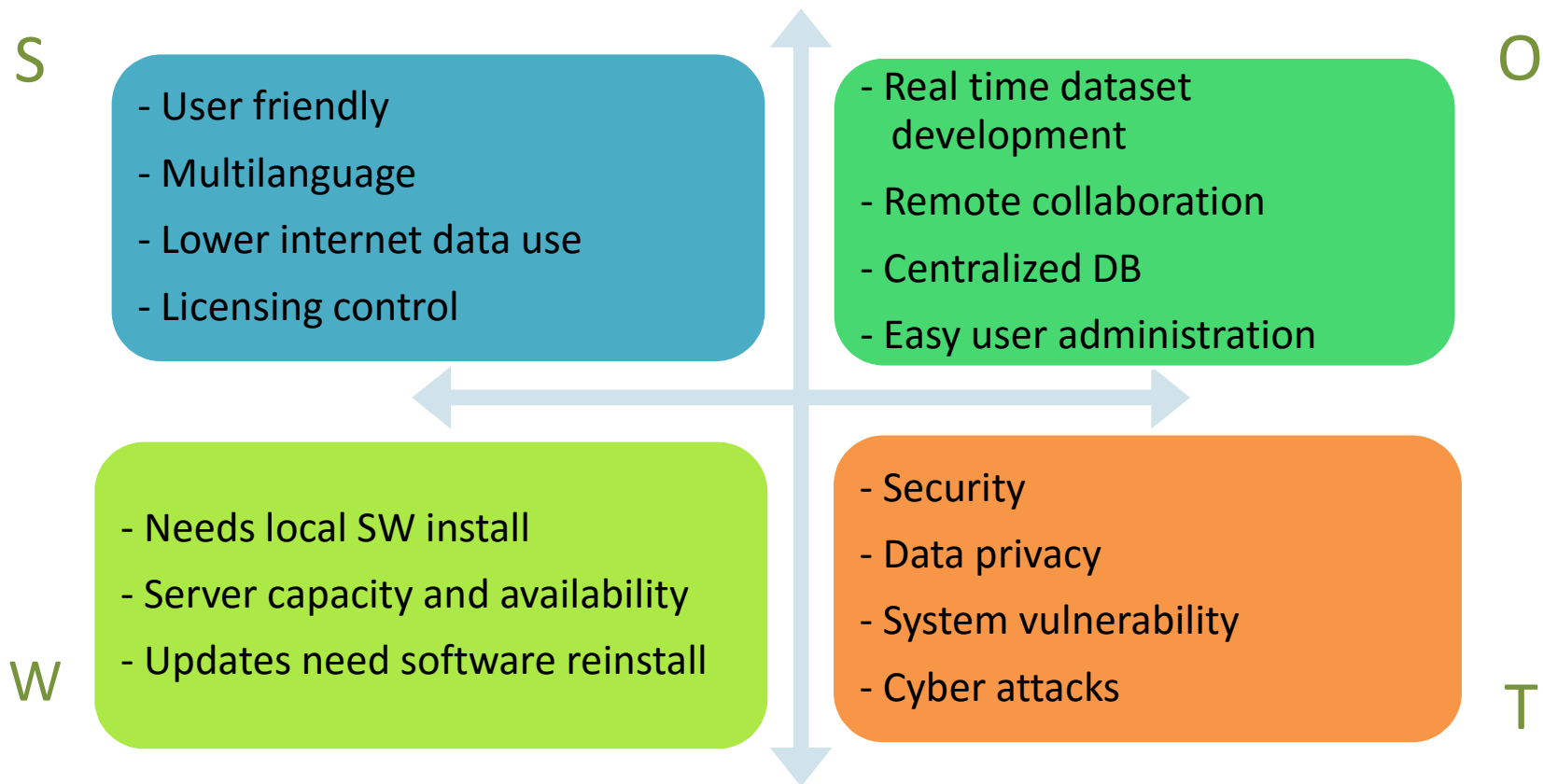
It's important to note that a system can be both. Any web-based system is also an online system. But not every online system is web-based.



# Web-based systems – SWOT analysis

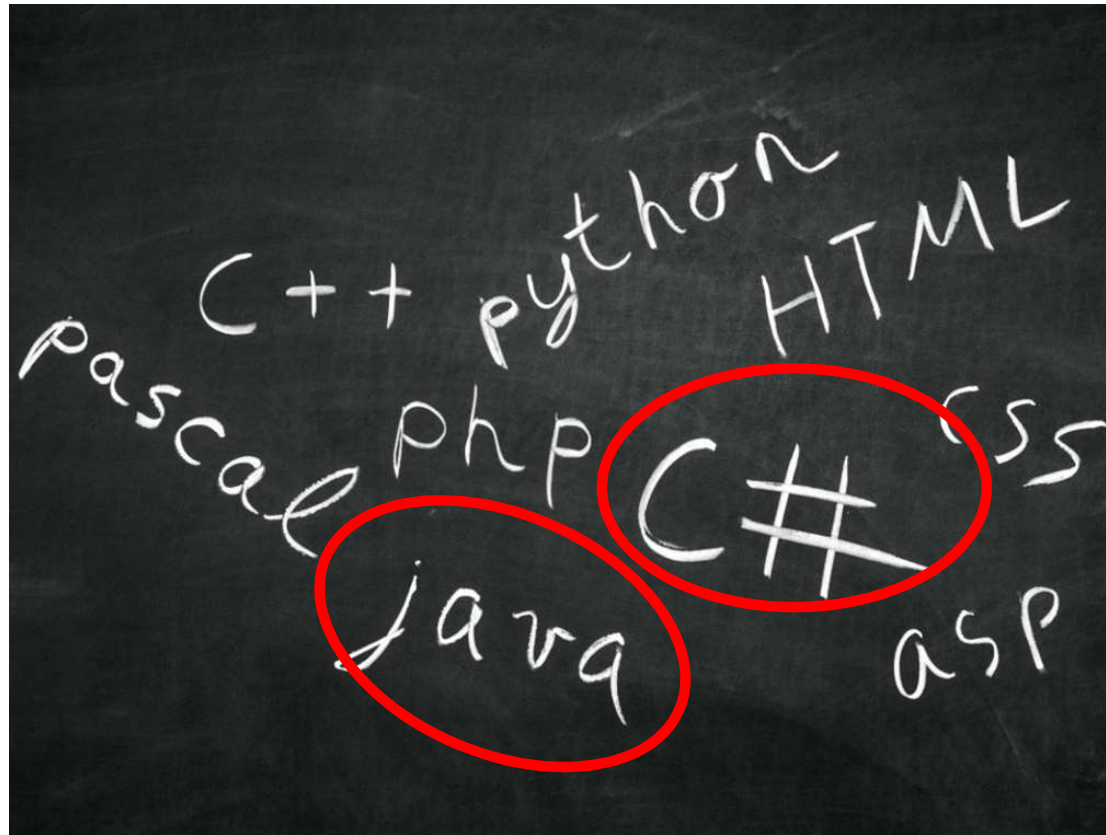


# Online systems – SWOT analysis



# System development - Programming languages

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# System development - Development framework

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Provides *libraries* of *objects* (buttons, Windows, controls, etc.) and *processes* (math, file management, etc.) to speed up application development (web, stand-alone and/or mobile).

Struts<sup>2</sup>



Spring



and many others...



# Database management

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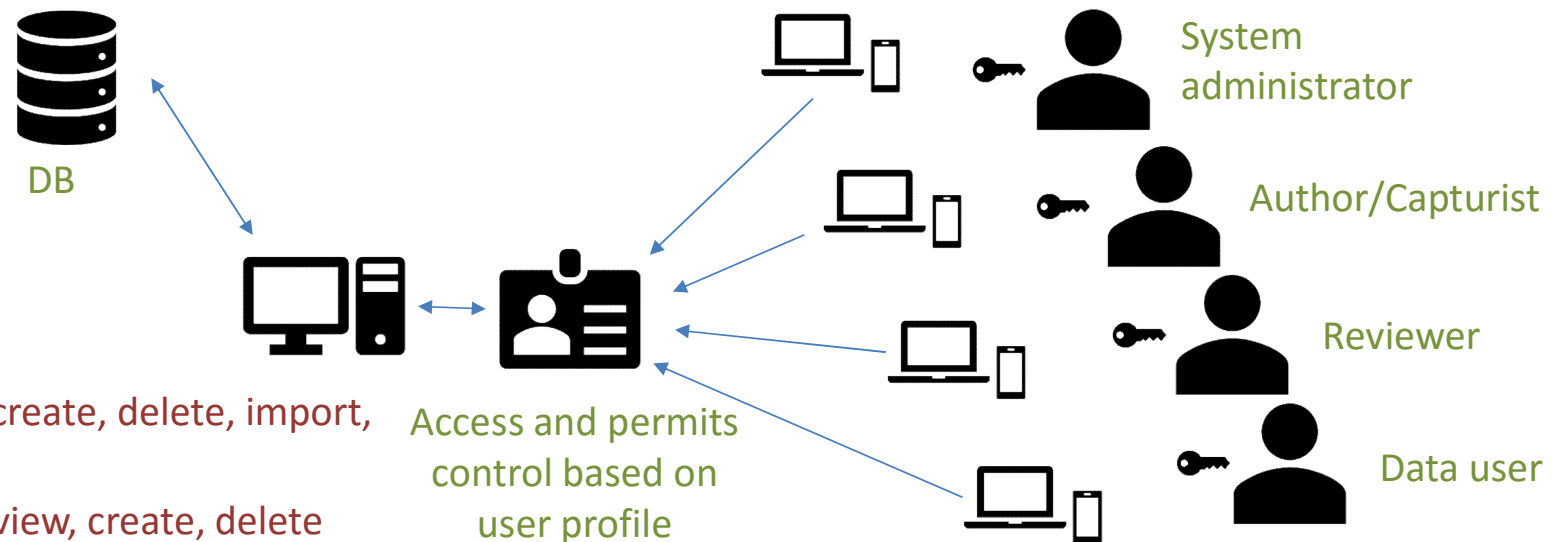
- Administrate resources in the database.
- Maintains safety of data, access control, and allows backup, among many other tasks
  - MS-SQL server
  - ORACLE
  - MySQL
  - PostgreSQL

# System Security

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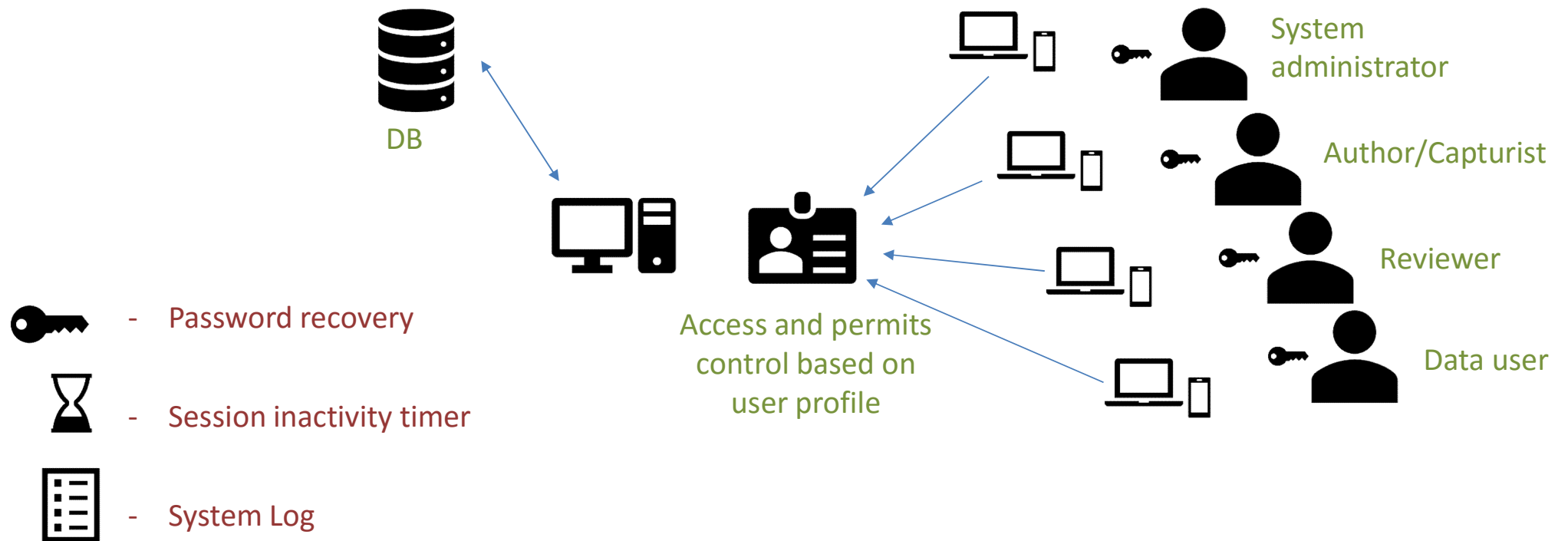
- Licensing
- User profile
  - Access control
  - Password management and recovery
- Data protection and confidentiality
- Database management
- Database backups
- Version control

# User profile



- Datasets: view, edit, review, create, delete, import, export
- Catalog inputs: view, edit, review, create, delete
- Users: add, remove, dataset assignment, group management
- User profiles: permits management

# User profile



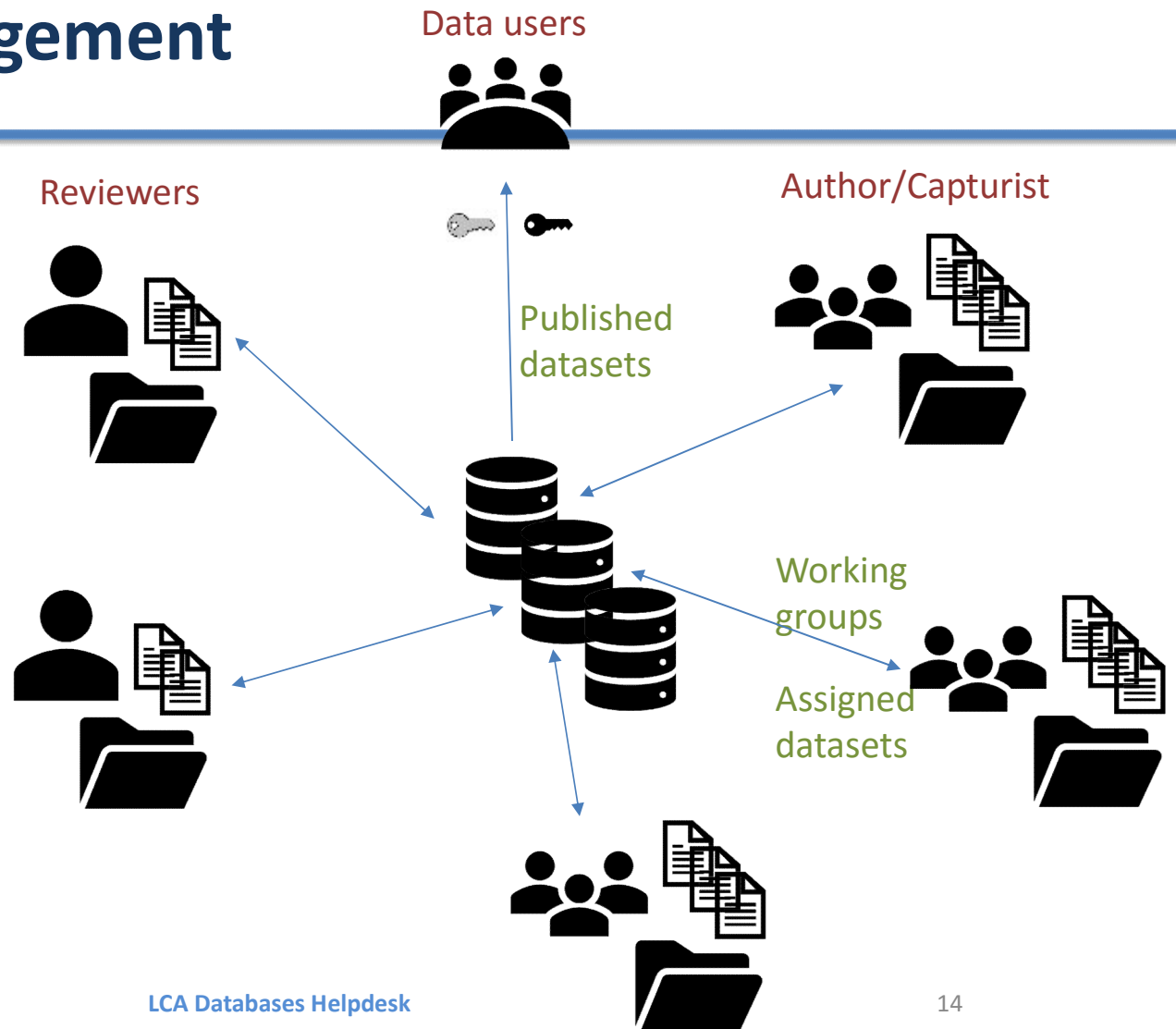


# Data protection and confidentiality

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- Maintaining data privacy
- Working groups
- Dataset assignment (individual, group)
- Dataset publication, general or restricted access

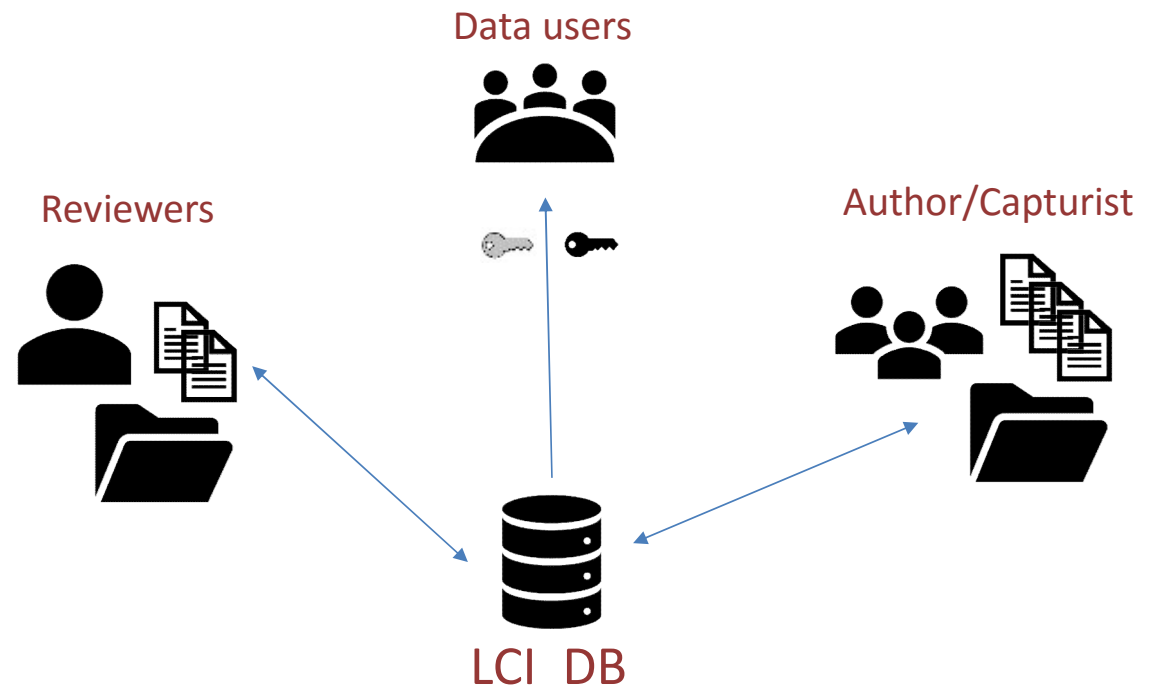
# Data and user management



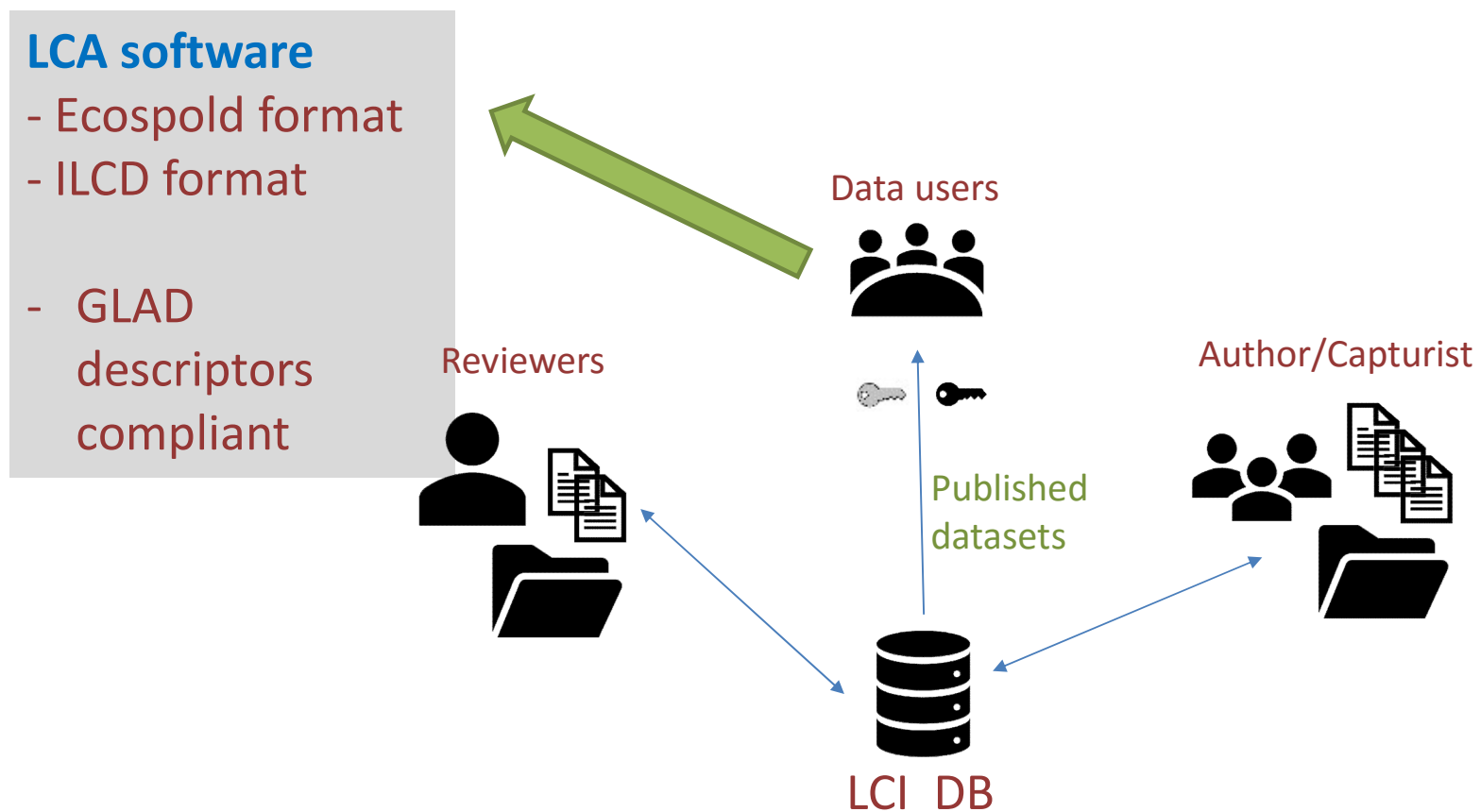
# Dataset development phases

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- Data input
- Reviewing
- Publishing



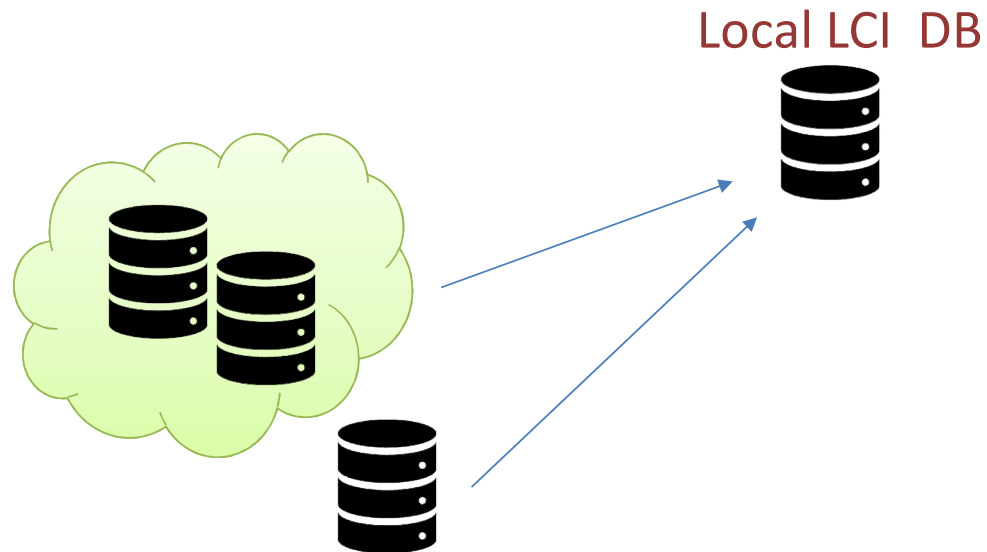
# Dataset development phases



# Support databases

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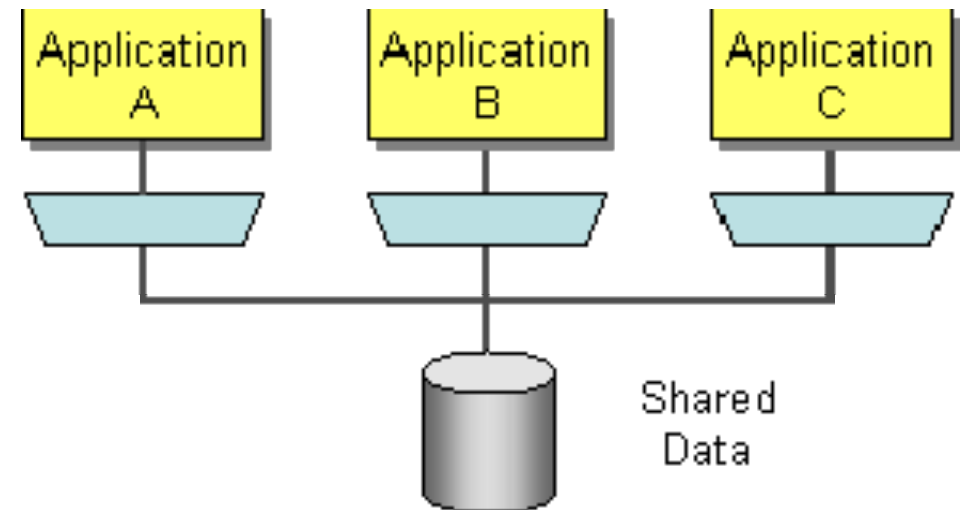
- Open and commercial LCI databases
- Using dataset references and metadata from other databases



# Databases

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- Ecoinvent
- ELCD
- Needs
- Bioenergiedat
- USDA\_crop\_data\_1\_1
- Mexicaniuh



# Support databases

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- Elementary flows are available in most of databases and can be used.
- Databases have different Intermediate flows depending on their scope and application, geography, etc.
- Both commercial and open databases can be referenced through metadata descriptors.

# Dataset searching

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- Built-on searching tools
- Important to provide with search tools in the LCI database:
- Find text, Filter, Ordering, etc
- Searching criteria
- Using GLAD Meta Descriptors and/or other attributes used for dataset documentation would assure future compatibility with search engines and other databases.



# LCA software

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LCA software supports different data formats and most of them have some variations in the format.

Also some differences in modeling concepts and features can be found.

But most of them have a common core of features and models.



**Source: Training on Data Acquisition and Dataset Development – Part 8 –Linking datasets, databases, and LCA software.**

August 2017 Version. (Content: Andreas Ciroth, GreenDelta and Amir Safaei, ecoinvent), Location: LCA Databases Helpdesk – [www.spcclearinghouse.org](http://www.spcclearinghouse.org)

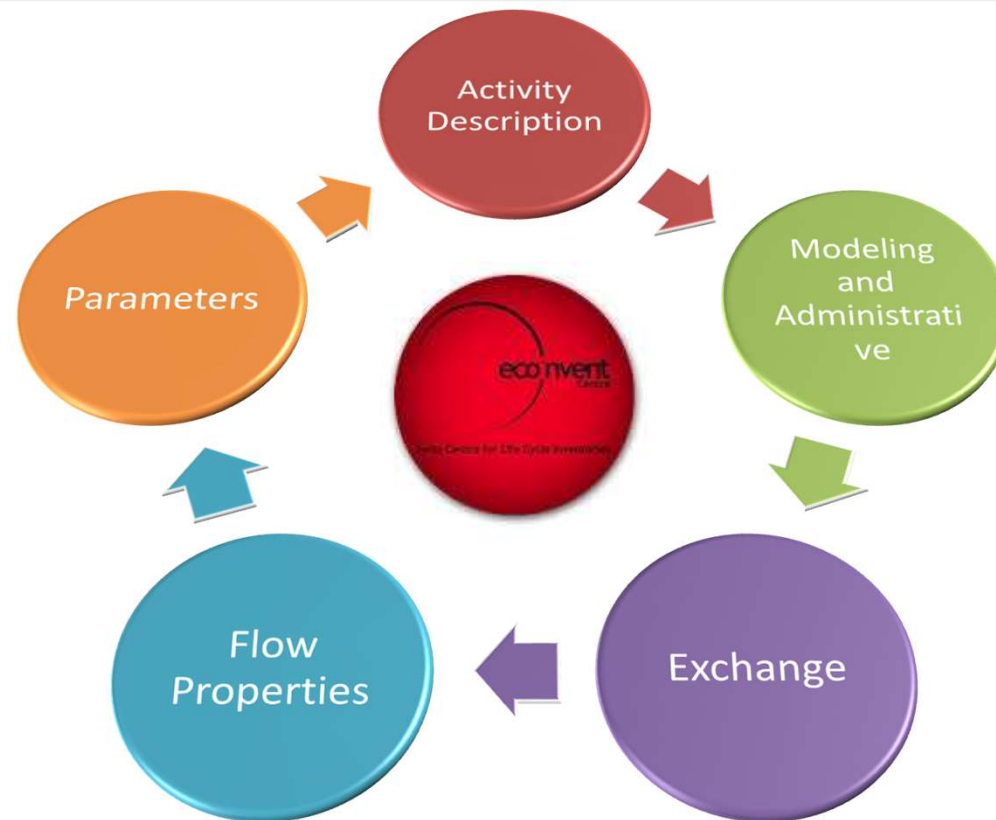
# Data Formats

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- Define how data is stored and how data is exchanged between different applications.
- The most widely used formats are Ecospold and ILCD.
- Most LCA software supports these formats with specific adaptations for which documentation is often not publicly available.

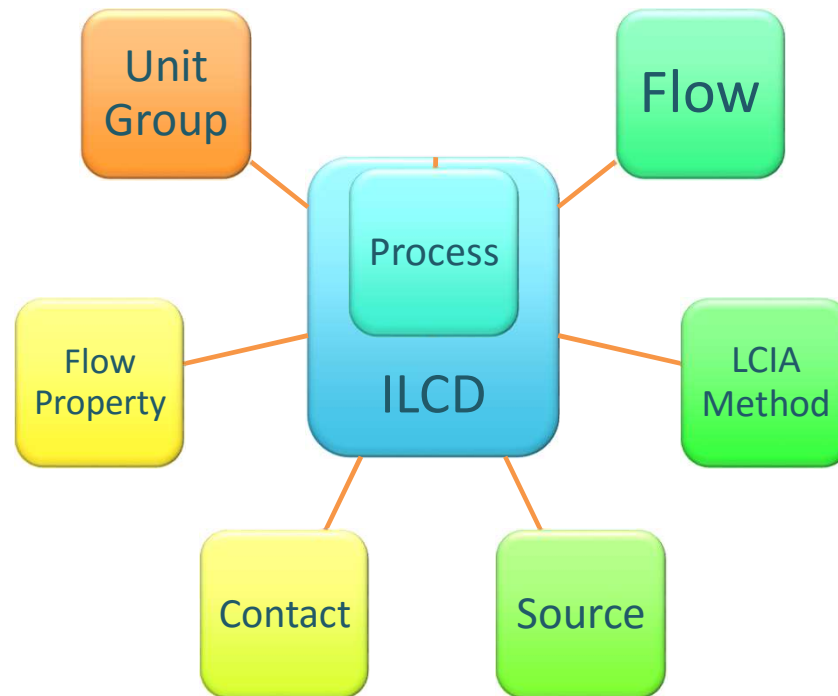
# EcoSpold v1 structure

---



# ILCD v1.1 structure

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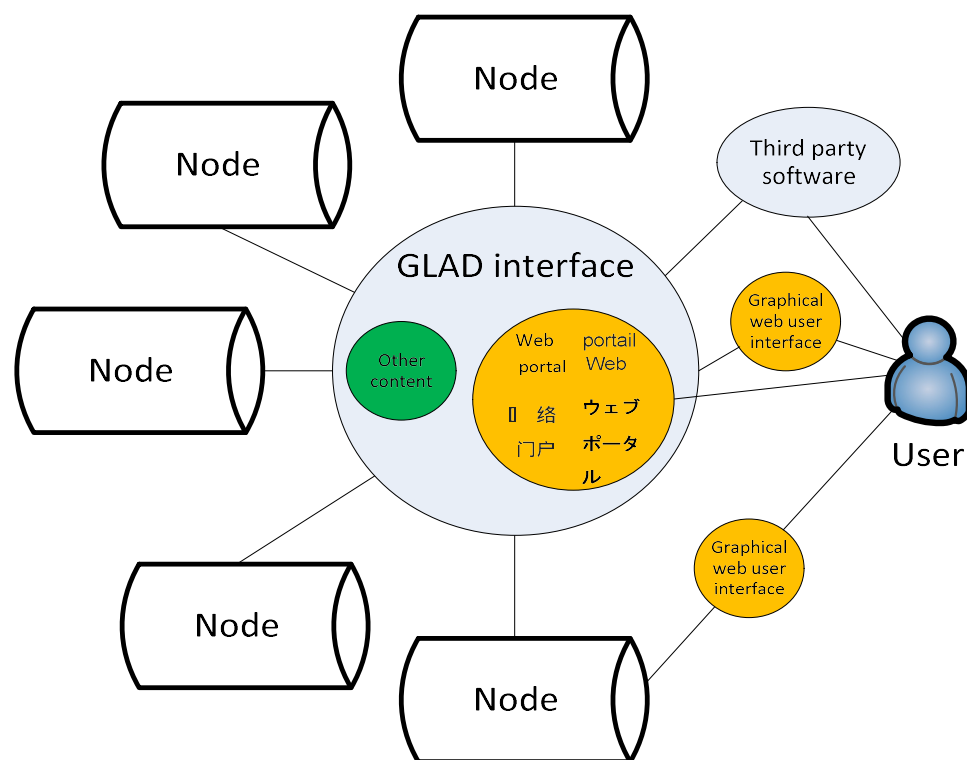
# XML formats

```
2 <ecoSpold xmlns="http://www.EcoInvent.org/EcoSpold02">CRLF
3 <activityDataset>CRLF
4 <activityDescription>CRLF
5 <activity id="1a091cc1-8544-4509-92f7-0c8b59d04d82" activityNameId="b606483a-3de2-4599-85e8-eb065d97c756" inheritance
6 type="1" specialActivityType="0">CRLF
7 <activityName xml:lang="en">mango production</activityName>CRLF
8 <includedActivitiesStart xml:lang="en">from preparing the field</includedActivitiesStart>CRLF
9 <includedActivitiesEnd xml:lang="en">with harvesting the mangos</includedActivitiesEnd>CRLF
10 <generalComment>CRLF
11 <text xml:lang="en" index="1">This dataset refers to the production of Mango in Sri Lanka.</text>CRLF
12 </generalComment>CRLF
13 </activity>CRLF
14 <geography geographyId="0c13823c-7d7e-11de-9ae2-0019e336be3a">CRLF
15 <shortname xml:lang="en">LK</shortname>CRLF
16 </geography>CRLF
17 <technology technologyLevel="3" />CRLF
18 <timePeriod startDate="2016-01-01" endDate="2016-12-31" isDataValidForEntirePeriod="true" />CRLF
19 <macroEconomicScenario macroEconomicScenarioId="d9f57f0a-a01f-42eb-a57b-8f18d6635801">CRLF
20 <name xml:lang="en">Business-as-Usual</name>CRLF
21 </macroEconomicScenario>CRLF
22 </activityDescription>CRLF
23 <flowData>CRLF
24 <intermediateExchange id="bc72e57d-5045-482f-85d6-066eaccfdcb8" unitId="487df68b-4994-4027-8fdc-a4dc298257b7" amount=
25 intermediateExchangeId="1c819f15-1202-4fa9-8ef9-72196c2dfb85">CRLF
26 <name xml:lang="en">apple</name>CRLF
27 <unitName xml:lang="en">kg</unitName>CRLF
28 <property propertyId="6d9e1462-80e3-4f10-b3f4-71febd6f1168" amount="0.83" unitId="487df68b-4994-4027-8fdc-a4dc29825
29 <name xml:lang="en">water in wet mass</name>CRLF
30 </unitName xml:lang="en">kg</unitName>CRLF
31 </property>CRLF
32 </intermediateExchange>CRLF
33 </flowData>CRLF
34 </dataset>CRLF
35 </ecoSpold>
```

**Source: Training on Data Acquisition and Dataset Development – Part 8 –Linking datasets, databases, and LCA software.**

August 2017 Version. (Content: Andreas Ciroth, GreenDelta and Amir Safaei, ecoinvent) Location: LCA Databases Helpdesk – [www.spcclearinghouse.org](http://www.spcclearinghouse.org)

# GLAD interface concept



***Central, multi-lingual, user interface, enabling access to **nodes worldwide**, ensuring interoperability through agreed **nomenclature** and **metadata descriptors*****

Training on Advanced Dataset Development and Global Network Access – Part 3 – GLAD Node Interface and User Access  
Content: Bruce Vigon, Breveja Environmental and Andreas Ciroth, GreenDelta, Location:

# Content provider

---

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# Part 4 - Review of Training on LCI Database

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## Concept and criteria

Content from: Bruce Vigon, Andreas Ciroth, Life Cycle Initiative, Regenerativa, CADIS.

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# Contwnts

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1. Criteria background
2. Criteria
3. Example results

# Criteria background (1/2)

---

- **Reviewing data is not a novel exercise**
  - Commercial databases have been doing it for a while
  - Use of self-defined processes and criteria
  - Not common in public databases (national and regional specially)
- **Why review?**
  - Assurance and verification of **data quality** in the contained datasets



Critical element of  
creating and  
managing databases

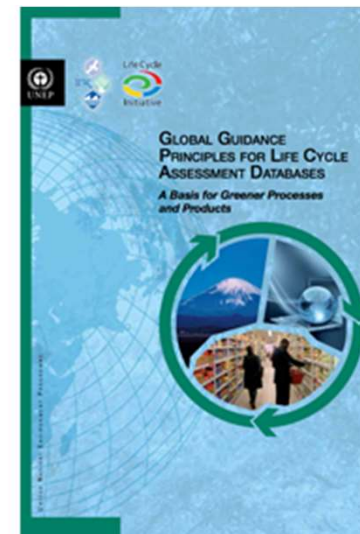
# Criteria background (2/2)

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- Current criteria come from Life Cycle Initiative's [Nantes Workshop in 2016](#)
- Based on [UNEP/SETAC Life Cycle Initiative publication on Global Guidance Principles for LCA Databases and LCI Dataset Review Criteria](#) (Ciroth et al. 2015)



“Updated review criteria”



# Criteria (1/2)

---

- **COMPREHENSIVE** while allowing reviewers to complete the review in a **REASONABLE AMOUNT OF TIME**
- **Two generic and basic requirements for the LCA datasets:**

1

*Every process dataset is a model of reality; as with every model, it is a simplification of reality, but should reflect important aspects of reality in a correct way*

2

*As a process dataset, the model will be used as part of a Life Cycle Assessment, and consist of input and output flows and meta-information, following principles of ISO 14048*

Data should be:

**Correct**

**Understandable  
and clear**

**Reflective of the basic  
LCA data structure  
described in ISO 10048**

# Criteria (2/2)

---

**There are 21 criteria divided in 5 clusters:**

- Cluster I: Goal and scope documentation completeness (7)
- Cluster II: Conformance (4)
- Cluster III: Sample conformance, correctness and reliability (5)
- Cluster IV: Materiality (3)
- Cluster V: Procedural and meta-information (2)

# Criteria - C1: Goal and scope documentation completeness

---

Criterion	Scope	Assessment
Reference time	Dataset level	YES - Reference is element specified for the dataset NO - Reference element is missing
Reference geography	Dataset level	YES - Reference element is specified for the dataset NO - Reference element is missing
Reference technology	Dataset level	YES - Reference element is specified for the dataset NO - Reference element is missing
Reference model completeness	Dataset level	YES - Reference element is specified for the dataset NO - Reference element is missing
Reference sample completeness	Dataset level	YES - Reference element is specified for the dataset NO - Reference element is missing
Sample approach	Dataset level	Expert base Scientific
Supported LCIA methods with version number	Dataset level	N/A

# Criteria – C2: Conformance

---

Criterion	Scope	Assessment
<b>Time related conformance</b> <i>Time difference between the reference time foreseen for the dataset according to the documentation and the time period for which data were surveyed</i>	Flow / exchange level and individual dataset field level	<p>1 - Less than 3 years of difference to the time period of the dataset (reference time)</p> <p>2 - Between 3 and 6 years of difference to the time period of the dataset (reference time)</p> <p>3 - Between 6 and 10 years of difference to the time period of the dataset (reference time)</p> <p>4 - Between 10 and 15 years of difference to the time period of the dataset (reference time)</p> <p>5 - Age of data unknown or more than 15 years of difference to time period of the dataset</p>

# Criteria – C2: Conformance

---

Criterion	Scope	Assessment
<b>Geographical conformance</b>  <i>Geographical difference between the reference area foreseen for the dataset according to the documentation and the area for which data were surveyed</i>	Flow / exchange level and individual dataset field level	1 - Data from an area under study  2 - Average data from a larger area from which the reference area is included  3 - Data from an area with similar production conditions  4 - Data from an area with slightly similar production conditions  5 - Data from unknown or distinctly different area



# Criteria – C2: Conformance

Criterion	Scope	Assessment
<p><b>Technological conformance</b></p> <p><i>Technological difference between the reference technology or technology mix foreseen for the dataset, according to documentation, and the technology for which data were surveyed. The criteria list distinguishes organisation, process (of creating or producing the product), and product. "Product" is not only quality but the sheer material, e.g. "steel" vs. "aluminium".</i></p>	<p>Flow / exchange level and individual dataset field level</p>	<p>1 - Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e. identical technology)- Data from processes and materials under study (i.e. identical technology) but from different organisations</p> <p>2 - Data from processes and products under study (with similar technology). Evidence of deviations in state of technology, e.g. different by-product.</p> <p>3 - Data from processes and products under study but from different technology. This score is also applied when NO technology is specified, e.g. "wheat (no further specification)"</p> <p>4 - Data on related processes or products; e.g. "organic wheat" under study, data for "organic rye" provided.</p> <p>5 - Data on related processes but with a different scale or from different technology; e.g. "organic wheat" under study, data for "conventional wheat" provided.</p>

# Criteria – C2: Conformance

Criterion	Scope	Assessment
<p><b>Model completeness conformance, flows and documentation</b></p> <p><i>Availability of information required for practitioners to select a dataset for application, beyond the narrower time, geography and technology criteria. This criterion is to combine all model-related aspects, which includes the reference flows used, and other dataset modelling aspects as well.</i></p>	Dataset level	<p>1 - Sufficient documentation easily available for the data set for modelling procedure, sources, aggregation procedure, system boundary setting, limitations; for sources also on the flow level.</p> <p>2 - One of the aspects modelling procedure, sources, aggregation procedure, system boundary setting, limitations insufficiently described or not easily available for the data set, for sources also on the flow level.</p> <p>3 - Two of the aspects modelling procedure, sources, limitations insufficiently described or not easily available for the data set.</p> <p>4 - Insufficient documentation (two of the aspects modelling procedure, sources, limitations lacking; or all not easily available for the data set).</p> <p>5 - No or very minimal documentation available.</p>

# Criteria - C3: Sample conformance, correctness and reliability

---

Criterion	Scope	Assessment
<b>Sample conformance</b>  <i>Representativeness of the information provided</i>	Flow / exchange level and individual dataset field level	<p>1 - Sample and thereby data is representative.</p> <p>2 - Sample and thereby data is in principle representative with some small exceptions.</p> <p>3 - Sample and thereby data mostly representative.</p> <p>4 - Doubts about representativeness of sample and thereby data.</p> <p>5 - Sample and thereby data is not representative of representativeness unknown.</p>

# Criteria - C3: Sample conformance, correctness and reliability

---

Criterion	Scope	Assessment
<p><b>Accuracy of the provided information</b></p> <p><i>This criterion measures the degree to which flow values in the dataset deviates from available benchmarks. This criterion serves to evaluate whether the dataset deviates from an unknown true value. Accuracy cannot not be evaluated per se. Inconsistent data is possibly not accurate. Similar to consistency, comparison to other reliable datasets and to technical domain expertise and natural laws for example can reveal whether a dataset is accurate</i></p>	<p>Entire dataset, preferably assessed at flow level</p>	<p>1 - Values are very close to those expected from benchmarks and/or relevant differences can be fully justified</p> <p>2 - Values are close to those expected from benchmarks and/or relevant differences can be partially justified</p> <p>3 - Some values deviate from those expected from benchmarks and differences cannot be justified</p> <p>4 - Many values deviate from those expected from benchmarks and differences cannot be justified</p> <p>5 - Most values deviate greatly from those expected from</p>

# Criteria - C3: Sample conformance, correctness and reliability

---

Criterion	Scope	Assessment
<p><b>Precision of the provided information</b></p> <p><i>The criterion serves to evaluate the information provided regarding the variance of any value given in the dataset. This criterion does not assess the variability of the values within the sample or the population.</i></p>	<p>Flow exchange level / focus is here on quantitative amount of exchanges</p>	<p>1 - Information is listed as datapoint and distribution with parameters, and the CV &lt; 1</p> <p>2 - Information is listed as a range between value “x” and “y” and range divided by mean is &lt; 0.5</p> <p>3 - Information is listed as datapoint</p> <p>4 - Information is listed as greater than “x”</p>

# Criteria - C3: Sample conformance, correctness and reliability

---

Criterion	Scope	Assessment
<b>Reliability of the provided information</b>  <i>Origin of the information used to create the dataset, according to documentation, flows and meta information.</i>	Flow / exchange level and individual dataset field level	1 - Independently verified measurement according to goal and scope with documented method compliant with relevant standards  2 - Unverified measurement according to goal and scope or verified measurement or verified calculation  3 - Unverified calculation  4 - Estimation with documented basis  5 - Undocumented estimate

# Criteria - C3: Sample conformance, correctness and reliability

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Criterion	Scope	Assessment
<b>Consistency of the provided information</b>  <i>This criterion serves to document whether data for input and output flows and for meta data does correspond and whether obvious data gaps and imbalances exist. It is assumed that data that do not show such flaws are consistent</i>	Dataset level	<p>1 – No inconsistencies found</p> <p>2 – Minor inconsistencies found that do not affect the overall reliability of the data set</p> <p>3 – Some inconsistencies found where the overall impact on the data set is not clear</p> <p>4 – Inconsistencies found which are likely to have an effect on the data set</p> <p>5 – The data set is inconsistent</p>

# Criteria – C4: Materiality

Criterion	Scope	Assessment
<p><b>Mass and energy balance in line with the goal and scope</b></p> <p><i>The difference in balance is assessed in relation to the sum of input or output, (depending on which is the larger amount) as follows:</i></p> <div style="background-color: #4a86e8; color: white; padding: 10px; margin: 10px 0;"> <math display="block">\Delta m = ( m_i - m_o ) / \max(m_i, m_o)</math> <math display="block">\Delta e = ( e_i - e_o ) / \max(e_i, e_o)</math> </div> <p><i>With: “mi”: sum of input mass flows</i></p> <p><i>“mo”: sum of output mass flows</i></p> <p><i>“ei”: sum of input energy flows</i></p> <p><i>“eo”: sum of output energy flows</i></p>	Dataset level	<p>1 - Mass and energy balance in line with goal and scope</p> <p>2 - Mass and energy balance mostly in line with goal and scope (e.g. <math>\Delta x &lt; 5\%</math>)</p> <p>3 - Mass and energy balance partly in line with goal and scope (e.g. <math>\Delta x &lt; 15\%</math>)</p> <p>4 - Mass and energy balance mostly not in line with goal and scope (e.g. <math>15\% \leq \Delta x \leq 75\%</math>)</p> <p>5 - Mass and energy balance is not in line with goal and scope (e.g. <math>\Delta x &gt; 75\%</math>)</p>



# Criteria – C4: Materiality

---

Criterion	Scope	Assessment
<b>LCIA in line with goal and scope</b>  <i>This criterion refers to the completeness of the LCIA results in relation to the environmental impact categories and methods declared in the goal and scope</i>	Dataset level	1 - LCIA complete regarding goal and scope  5 - LCIA <u>not</u> complete regarding goal and scope

# Criteria – C4: Materiality

---

Criterion	Scope	Assessment
<p><b>Order of 5 main drivers for main LCI results in line with goal and scope</b></p> <p><i>This criterion assesses whether the order, i.e. the rank when ordered by amount, of main LCIA results is in line with goal and scope</i></p>	Dataset level	<p>1 - Order of 5 main drivers for main LCI results in line with goal and scope</p> <p>5 - Order of 5 main drivers for main LCI results <u>not</u> in line with goal and scope</p>

# Criteria – C5: Procedural and meta-information

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Criterion	Scope	Assessment
<b>Number of reviewers and their relation with the data provider</b>  <i>This criterion serves to document whether the dataset has been critically reviewed and how, according to different review schemes</i>	Dataset level	1 - One or more independent external reviewers  2 - Two or more independent internal reviewers  3 - One independent internal or two or more internal reviewers  4 - One internal reviewer  5 - No review has been performed

# Criteria – C5: Procedural and meta-information

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Criterion	Scope	Assessment
<b>Data access</b>  <i>Data access refers to the extent to which it is possible to check the underlying data and model of a fully or partially aggregated dataset.</i>	Dataset level	1 - Full access to the supply chain model  3 - Limited access to the supply chain model  5 - No access to the supply chain model

# Example (1/5) - “Wine, processing” dataset

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## C1: Goal and scope documentation completeness

Criterion	General comments	Score
<b>Reference geography</b>	Reference element is specified for the dataset	Yes
<b>Reference technology</b>	“Traditional production”. More details are desired	Yes
<b>Reference model completeness</b>	Metadata is very poor in terms of details. Thus, it is not possible to evaluate model completeness	No
<b>Reference sample completeness</b>	Dataset is based on two different wine producers in Chile representing 90% of national exports. However, it would be good to have additional data about sample size.	Yes
<b>Supported LCIA methods with version number</b>	Data about LCIA methods are missing	N/A

# Example (2/5) - “Wine, processing” dataset

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## C2: Conformance

Criterion	General comments	Score (1-5)
<b>Time - related conformance</b>	Less than 3 years of difference to the time period of the dataset (reference time)	1
<b>Geographical conformance</b>	Details about regional location and specific area under study are missing	2
<b>Technological conformance</b>	It is difficult to understand how wine is produced since there is no description of the system boundaries as well as for the technological approach adopted for each unit process	3
<b>Model completeness conformance, flows and documentation</b>	It is difficult to understand how the dataset was modelled. Foreground and background subsystem should be detailed as well as all the unit processes involved in the modelling process.	4

# Example (3/5) - “Wine, processing” dataset

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C3: Sample conformance, correctness and reliability

Criterion	General comments	Score (1-5)
<b>Sample conformance</b>	It is not possible to verify the sample conformance	4
<b>Accuracy of the provided information</b>	There is no information about how input and output flows were measured. It is difficult to compare results with other datasets as a benchmark	4
<b>Precision of the provided information</b>	Information is listed as a data point	3 (1-4)
<b>Reliability of the provided information</b>	Most of input and output flows are missed of documentation. Thus, it is not possible to check reliability of information	5
<b>Consistency of the provided information</b>	Some inconsistencies were found where the overall impact on the dataset is not clear. Several flows do not have a unit.	3

# Example (4/5) - “Wine, processing” dataset

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## C4: Materiality

Criterion	General comments	Score (1 or 5)
<b>Mass and energy balance in line with goal and scope</b>	It is not possible to calculate mass and energy balances because there are some flows with unspecified units. Several emissions are missing	5 (1-5)
<b>LCIA results in line with goal and scope</b>	No LCIA method was provided in relation to the goal and scope of the dataset.	5
<b>Order of 5 main drivers for main LCI results in line with goal and scope</b>	As no LCIA method was described in the goal and scope definition as well as any LCIA results was calculated, it is not possible to check this item.	5



# Example (5/5) - “Wine, processing” dataset

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## C5: Procedural and meta-information

Criterion	General comments	Score
<b>Number of reviewers and their relation to the data provider</b>	One or more independent external reviewers	1 (1-5)
<b>Data access</b>	It is not possible to check data access in details because all input and output flows are available in an Excel sheet and not in ecoSpold or ILCD formats.	5 (1,3 or 5)

# Part 5 - Review of Training on LCI Database

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## Exercise

Content from: Bruce Vigon, Andreas Ciroth, Life Cycle Initiative, Regenerativa, CADIS.

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### Disclaimer

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

# Agenda

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1. Exercise: Assess Chilean dataset against the criteria
2. Self evaluation

# Exercise: Assessing Chilean blueberry dataset against the criteria

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## Instructions:

- Divide into groups of 3-5 people
- You will be provided with one printed dataset
- Every group will be assigned 3 criteria from different clusters. Assess the dataset using the criteria provided.

Nº	Criterio	Descripción del criterio	Alcance	Evaluación	Puntaje revisor	Justificación/comentario
<b>Grupo I: Completitud del objetivo y alcance</b>						
1	Tiempo de referencia	N/A	Nivel de dataset	Si – Elemento de referencia está especificado para el dataset No – Falta elemento de referencia		
2	Geografía de referencia	N/A	Nivel de dataset	Si – Elemento de referencia está especificado para el dataset No – Falta elemento de referencia		
3	Tecnología de referencia	N/A	Nivel de dataset	Si – Elemento de referencia está especificado para el dataset No – Falta elemento de referencia		
4	Completitud del modelo de referencia	N/A	Nivel de dataset	Si – Elemento de referencia está especificado para el dataset No – Falta elemento de referencia		
5	Completitud de la muestra de referencia	N/A	Nivel de dataset	Si – Elemento de referencia está especificado para el dataset No – Falta elemento de referencia		
6	Enfoque de la muestra	N/A	Nivel de dataset	Basado en expertos Científico		
7	Métodos de LCIA reforzado con número de versión	N/A	Nivel de dataset	N/A		
<b>Grupo II: Conformidad</b>						
8	Conformidad temporal	Tiempo de referencia entre el tiempo previsto para el dataset de acuerdo a la documentación y el período de tiempo en el cual se estudiaron los datos	Flujo / nivel de intercambios y campo del dataset individual	1 - Menos de tres años de diferencia con respecto al tiempo de referencia del dataset 2 - Entre 3 y 6 años de diferencia con respecto al tiempo de referencia del dataset 3 - Entre 6 y 10 años de diferencia con respecto al tiempo de referencia del dataset 4 - Entre 10 y 15 años de diferencia con respecto al tiempo de referencia del dataset 5 - Fecha de los datos es desconocida o hay más de 15 años de diferencia con respecto al tiempo de referencia del dataset		
9	Conformidad geográfica	Diferencia geográfica entre el área de referencia prevista para el dataset de acuerdo con la documentación y el área para la cual se estudiaron los datos	Flujo / nivel de intercambios y campo del dataset individual	1 - Datos de un área bajo estudio 2 - Datos promedio de un área más grande en la cual el área bajo estudio está incluida 3 - Datos de un área con condiciones de producción similares 4 - Datos de un área con condiciones de producción ligeramente similares 5 - Datos de un área desconocida o completamente distinta		
10	Conformidad tecnológica	Diferencia tecnológica entre la tecnología de referencia o el mix tecnológica previsto por el dataset de acuerdo a la documentación y la tecnología para la cual se estudiaron los datos. La lista de criterios distingue organización, proceso (de creación o producción del producto) y el producto. "Producto" no es solo calidad sino también material, e.g. "acero" vs. "aluminio".	Flujo / nivel de intercambios y campo del dataset individual	1 - Datos de procesos y productos bajo estudio. El mismo nivel tecnológico aplicado tal como es definido en el objetivo y el alcance (i.e. idéntica tecnología). - Datos de procesos y productos bajo estudio. El mismo nivel tecnológico aplicado tal como es definido en el objetivo y alcance (i.e. idéntica tecnología) pero de diferentes organizaciones. 2 - Datos de procesos y productos bajo estudio (con similar tecnología). Evidencia de desviaciones en el nivel tecnológico, e.g. co-productos diferentes. 3 - Datos de procesos y productos bajo estudio pero de diferentes tecnologías. Este puntaje es aplicado también cuando la tecnología no se especifica, e.g. "trigo (sin especificación adicional)". 4 - Datos de procesos o productos relacionados; e.g. "trigo orgánico" bajo estudio y datos para "centeno orgánico". 5 - Datos de procesos relacionados pero con una escala diferente o con tecnologías diferentes; e.g. "trigo orgánico" bajo estudio, datos para "trigo convencional".		
11	Conformidad con la completitud del modelo, flujos y documentación	Disponibilidad de información requerida para profesionales para seleccionar un dataset para aplicación, más allá del criterio del tiempo, geografía y tecnología. El criterio consiste en combinar todos los aspectos relacionados con el modelo, los cuales incluyen los flujos de referencia utilizados, al igual que otros aspectos de la modelación.	Nivel de dataset	1 - Suficiente documentación fácilmente disponible para el procedimiento de modelación del dataset, fuentes, procedimiento de agregación, ajustes a los límites del sistema y limitaciones; para fuentes, además a nivel de flujo. 2 - Uno de los aspectos, procedimiento de modelación, fuentes, procedimiento de agregación, ajustes a los límites del sistema o limitaciones, están descritos de manera insuficiente o no están disponibles fácilmente para el dataset; para fuentes, también a nivel de flujos. 3 - Dos de los aspectos, procedimiento de modelación, fuentes, limitaciones, están descritos de manera insuficiente o no están disponibles fácilmente para el dataset. 4 - Documentación insuficiente (faltan dos de los aspectos, procedimiento de modelación, fuentes, limitaciones; o todos no están disponibles fácilmente para el dataset) 5 - Disponibilidad de documentación mínima o inexistente.		
<b>Grupo III: Conformidad, exactitud y confiabilidad de la muestra</b>						
12	Conformidad de la muestra	Representatividad de la información provista	Flujo / nivel de intercambios y campo del dataset individual	1 - Muestra y, por lo tanto, los datos son representativos 2 - Muestra y, por lo tanto, los datos son en principio representativas con pequeñas excepciones 3 - Muestra y, por lo tanto, los datos son mayormente representativos 4 - Dudas acerca de la representatividad de la muestra y, por lo tanto, de los datos 5 - Muestra y, por lo tanto, los datos no son representativos o la representatividad es desconocida		
13	Exactitud de la información provista	Este criterio mide el grado en que el valor del flujo en el dataset se desvía de los puntos de referencias disponibles (benchmarks). Este criterio sirve para evaluar si el dataset se desvía desde un valor verdadero desconocido. La exactitud no puede ser evaluada per se. Datos inconsistentes posiblemente no son exactos. En forma similar a consistencia, la comparación con otros datasets confiables, el dominio técnico experto y las leyes de la naturaleza, por ejemplo, puede revelar si el dataset es exacto.	Base de datos completa, preferentemente evaluada a nivel de flujo	1 - Valores son muy cercanos a los puntos de referencia (benchmarks) y/o diferencias relevantes pueden ser completamente justificadas. 2 - Valores son muy cercanos a los puntos de referencia (benchmarks) y/o diferencias relevantes pueden ser parcialmente justificadas. 3 - Valores son muy cercanos a los puntos de referencia (benchmarks) y diferencias relevantes no pueden ser justificadas 4 - Muchos valores se desvían desde los puntos de referencia (benchmarks) y las diferencias no puede ser justificadas. 5 - La mayoría de los valores de desvía considerablemente de los puntos de referencia (benchmarks).		
14	Precisión de la información provista	El criterio sirve para evaluar la información provista en relación a la varianza de cualquiera de los valores presentes en el dataset. Este criterio no evalúa la variabilidad de los valores dentro de la muestra poblacional.	Flujo / nivel de intercambio; el foco acá está en las cantidades cuantitativas de intercambios	1 - Información es listada como punto de datos (data point), y la distribución con parámetros, y el CV (coeficiente de variación) es < 1. 2 - La información es listada como un rango entre el valor x e y, y el cociente entre el rango y la media es < 0.5. 3 - Información es listada como un punto de datos (datapoint). 4 - Información es listada como "mayor que x".		
15	Confiabilidad de la información provista	Origen de la información usada para crear el dataset, de acuerdo a la documentación, flujos y meta-información.	Flujo / nivel de intercambios y campo del dataset individual	1 - Medición verificada de forma independiente de acuerdo al objetivo y alcance con un método documentado y acorde a estándares relevantes. 2 - Medición no verificada de acuerdo a objetivo y alcance o medición verificada, o cálculo verificado. 3 - Cálculo no verificado 4 - Estimación con una base documentada 5 - Estimación sin documentación		
16	Consistencia de la información provista	Este criterio sirve para documentar si los datos para flujos de entradas y salidas y meta-datos corresponden, y si existen brechas y desequilibrios obvios en los datos. Se asume que los datos que no muestran aquellas fallas son consistentes.	Nivel de dataset	1 - No se encontraron inconsistencias 2 - Se encontraron inconsistencias menores que no afectan la confiabilidad general del dataset. 3 - Se encontraron algunas inconsistencias donde el impacto general sobre el dataset no es claro. 4 - Se encontraron inconsistencias que probablemente tendrán un efecto en el dataset. 5 - El dataset es inconsistente.		

METADATA	
<b>Producto</b>	Arándano - VIII Región
<b>Objetivo</b>	Creación de modelos representativos de la realidad productiva chilena del producto, para el mercado alimentario y vitivinícola de exportación
<b>Alcance</b>	De la cuna a la puerta de granja
<b>Años a incluir</b>	2012 - 2014
<b>Regiones</b>	VIII - BioBio
<b>Tecnología</b>	Producción tradicional
<b>Fuente de Información Principal</b>	Ficha técnica ODEPA-MINAGRI Chile - Arándano VIII Región
<b>Tecnología cubierta por fuente de información principal</b>	Producción tradicional
<b>Años cubiertos por fuente de información principal</b>	2014

## INVENTARIO DE CICLO DE VIDA

<b>Nombre producto</b>	Arándano
<b>Categoría producto</b>	Fruta fresca & procesada
<b>Región</b>	BioBio
<b>Fuente información principal</b>	Ficha técnica ODEPA
<b>Rendimiento</b>	8,5 ton/ha

Entradas	Compartimiento	Número CAS	Cantidad	Unidad	Unitario	Comentario	Fuente información (si es distinta a principal)
Uso de suelo, cultivo perenne, fruta, intensivo	Suelo		1,00E+04	m2a	1,18E+00		
Cambio de uso de suelo, desde tierras de cultivos anuales	Suelo		1,97E+02	ha	2,32E-02	Calculado a partir de herramienta Block Consultants - Direct Land Use Change Assessment Tool	
Cambio de uso de suelo, hasta tierras de cultivos perenne	Suelo		5,00E+00	ha	5,88E-04	Calculado a partir de herramienta Block Consultants - Direct Land Use Change Assessment Tool	
Cambio de uso de suelo, desde tierras de cultivos perenne	Suelo		5,00E+00	ha	5,88E-04	Calculado a partir de herramienta Block Consultants - Direct Land Use Change Assessment Tool	
Cambio de uso de suelo, hasta tierras de cultivos anuales	Suelo		1,97E+02	ha	2,32E-02	Calculado a partir de herramienta Block Consultants - Direct Land Use Change Assessment Tool	
Urea, como N			5,98E+01	kg	7,04E-03		
Ácido fosfórico			5,10E+01	L	6,00E-03		
Fertilizante nitrógeno, como N			5,81E+01	kg	6,84E-03		Fuente: <a href="http://www.blueberrieschile.cl/paper/Presentaci%C3%B3n-de-Nutrici%C3%B3n-en-ar%C3%A1ndanos-INIA2.pdf">http://www.blueberrieschile.cl/paper/Presentaci%C3%B3n-de-Nutrici%C3%B3n-en-ar%C3%A1ndanos-INIA2.pdf</a>
Fertilizante potasio, como K2O			4,63E+01	kg	5,45E-03		
Magnesio			3,61E+01	kg	4,24E-03		
Azufre			4,30E+01	kg	5,06E-03		
Cloruro de sodio			5,00E+00	kg	5,88E-04		
Aminoácidos			2,36E-01	L	2,78E-05		
Compost			3,04E-01	L	3,58E-05		
Fertilizante fosfato, como P2O5			2,77E+00	kg	3,26E-04		
Boro			1,03E+00	kg	1,21E-04		
Hierro			1,60E-03	kg	1,88E-07		
Manganeso			1,20E-03	kg	1,41E-07		
Zinc			1,65E+00	kg	1,94E-04		
Oxocloruro de Cobre			2,88E+00	kg	3,39E-04		
F5000 (Dummy)			3,00E-03	kg	3,53E-07		
Clorotalonil			1,44E+00	L	1,69E-04		
Bioflavonoides (Dummy)			1,00E+00	L	1,18E-04		
Ciprodinil			3,80E-01	L	4,47E-05		
Fludioxonil			2,50E-01	L	2,94E-05		
Haloxifop			1,04E+00	L	1,22E-04		
Paraquat			3,32E-01	L	3,91E-05		
Diquat			2,98E-01	L	3,51E-05		
Glifosato			1,99E+00	L	2,34E-04		
Abamectina			1,80E-02	L	2,12E-06		
Fosmet			1,40E+00	kg	1,65E-04		
Bacillus thuringiensis (Dummy)			9,60E-02	kg	1,13E-05		
Electricidad (CL - SIC), medio voltaje			2,80E+03	KWh	3,29E-01		
Agua, origen natural desconocido, CL	Agua superficial	7732-18-5	4,06E+03	m3	4,77E-01	Obtenido de "Determinación de la huella del agua y estrategias de manejo de recursos hídricos"	
Salidas			Cantidad	Unidad		Comentario	Fuente información (si es distinta a principal)
Agua	Aire	7732-18-5	3,65E+03	m3	4,29E-01	Actualizado con "Determinación de la huella del agua y estrategias de manejo de recursos hídricos"	Sección 3.5.4 WFDB
Agua, CL	Agua superficial	7732-18-5	3,18E+02	m3	3,75E-02	Calculado a partir metodología Ecobase	Sección 3.5.4 WFDB
Agua, CL	Agua subterránea	7732-18-5	8,72E+01	m3	1,03E-02	Calculado a partir metodología Ecobase	Sección 3.5.4 WFDB
Amoniaco	Aire	7664-41-7	1,66E+01	kg	1,96E-03	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Óxido nitrroso	Aire	10024-97-2	2,80E+00	kg	3,29E-04	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Nox, como NO2	Aire	10102-44-0	3,88E+00	kg	4,56E-04	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	

Nitrato, como N	Agua subterránea	14797-55-8	2,59E+01	kg	3,05E-03	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Fosfato, como P	Agua superficial	14265-44-2	1,50E-01	kg	1,76E-05	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Fósforo	Agua superficial	7723-14-0	6,10E-01	kg	7,18E-05	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Fosfato, como P	Agua subterránea	14265-44-2	6,00E-02	kg	7,06E-06	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Dióxido de carbono, fósil	Aire	124-38-9	9,39E+01	kg	1,10E-02	Calculado a partir metodología Ecobase. Ver archivo "Direct Emissions" del inventario	
Dióxido de carbono, cambio de uso de suelo	Aire	124-38-9	0,00E+00	kg	0,00E+00	Calculado a partir de herramienta Block Consultants - Direct Land Use Change Assessment Tool	
Cadmio	Agua subterránea	7440-43-9	4,65E-07	kg	5,48E-11		
Cadmio	Agua superficial	7440-43-9	1,84E+01	kg	2,16E-03		
Cadmio	Suelo	7440-43-9	6,40E-06	kg	7,53E-10	No está considerado la contribución de la semilla ni de la biomasa por falta de información	
Cobre	Agua subterránea	7440-50-8	3,59E-03	kg	4,23E-07		
Cobre	Agua superficial	7440-50-8	2,52E+05	kg	2,96E+01		
Cobre	Suelo	7440-50-8	1,45E+00	kg	1,70E-04	No está considerado la contribución de la semilla ni de la biomasa por falta de información	
Zinc	Agua subterránea	7440-66-6	3,13E-02	kg	3,68E-06		
Zinc	Agua superficial	7440-66-6	4,28E+05	kg	5,03E+01		
Zinc	Suelo	7440-66-6	1,22E+00	kg	1,44E-04	No está considerado la contribución de la semilla ni de la biomasa por falta de información	
Plomo	Agua subterránea	7439-92-1	4,55E-06	kg	5,35E-10		
Plomo	Agua superficial	7439-92-1	1,22E+03	kg	1,43E-01		
Plomo	Suelo	7439-92-1	1,34E-04	kg	1,57E-08	No está considerado la contribución de la semilla ni de la biomasa por falta de información	
Níquel	Agua subterránea	7440-02-0	0,00E+00	kg	0,00E+00	Factor no disponible para Níquel	
Níquel	Agua superficial	7440-02-0	7,24E+03	kg	8,52E-01		
Níquel	Suelo	7440-02-0	0,00E+00	kg	0,00E+00	Factor no disponible para Níquel	
Cromo	Agua subterránea	7440-47-3	1,41E-03	kg	1,66E-07		
Cromo	Agua superficial	7440-47-3	1,16E+04	kg	1,36E+00		
Cromo	Suelo	7440-47-3	-6,03E-04	kg	-7,09E-08	No está considerado la contribución de la semilla ni de la biomasa por falta de información	
Mercurio	Agua subterránea	7439-97-6	3,29E-08	kg	3,88E-12		
Mercurio	Agua superficial	7439-97-6	1,26E+01	kg	1,48E-03		
Mercurio	Suelo	7439-97-6	9,81E-07	kg	1,15E-10	No está considerado la contribución de la semilla ni de la biomasa por falta de información	
Clorotalonilo	Aire	1897-45-6	8,35E-03	kg	9,83E-07	Calculado usando PestLCI	PestLCI
Clorotalonilo	Agua superficial	1897-45-6	3,17E-05	kg	3,73E-09	Calculado usando PestLCI	PestLCI
Clorotalonilo	Agua subterránea	1897-45-6	2,59E-04	kg	3,05E-08	Calculado usando PestLCI	PestLCI
Ciprodinil	Aire	121552-61-2	3,53E-04	kg	4,16E-08	Calculado usando PestLCI	PestLCI
Ciprodinil	Agua superficial	121552-61-2	1,37E-05	kg	1,61E-09	Calculado usando PestLCI	PestLCI
Ciprodinil	Agua subterránea	121552-61-2	2,43E-05	kg	2,86E-09	Calculado usando PestLCI	PestLCI
Haloxifop	Aire	69806-34-4	2,08E-04	kg	2,45E-08	Calculado usando PestLCI	PestLCI
Haloxifop	Agua superficial	69806-34-4	8,74E-07	kg	1,03E-10	Calculado usando PestLCI	PestLCI
Haloxifop	Agua subterránea	69806-34-4	6,24E-05	kg	7,34E-09	Calculado usando PestLCI	PestLCI
Diquat	Aire	85-00-7	8,94E-04	kg	1,05E-07	Calculado usando PestLCI	PestLCI
Diquat	Agua superficial	85-00-7	1,76E-02	kg	2,07E-06	Calculado usando PestLCI	PestLCI
Diquat	Agua subterránea	85-00-7	4,77E-03	kg	5,61E-07	Calculado usando PestLCI	PestLCI
Paraquat	Aire	4685-14-7	9,96E-04	kg	1,17E-07	Calculado usando PestLCI	PestLCI
Paraquat	Agua superficial	4685-14-7	1,96E-02	kg	2,30E-06	Calculado usando PestLCI	PestLCI
Paraquat	Agua subterránea	4685-14-7	5,31E-03	kg	6,25E-07	Calculado usando PestLCI	PestLCI
Glifosato	Aire	1071-83-6	5,96E-03	kg	7,01E-07	Calculado usando PestLCI	PestLCI
Glifosato	Agua superficial	1071-83-6	1,87E-03	kg	2,20E-07	Calculado usando PestLCI	PestLCI
Glifosato	Agua subterránea	1071-83-6	1,09E-02	kg	1,29E-06	Calculado usando PestLCI	PestLCI
Abamectina	Aire	71751-41-2	1,60E-04	kg	1,88E-08	Calculado usando PestLCI	
Abamectina	Agua superficial	71751-41-2	9,36E-08	kg	1,10E-11	Calculado usando PestLCI	
Abamectina	Agua subterránea	71751-41-2	6,84E-07	kg	8,05E-11	Calculado usando PestLCI	
Fosmet	Aire	732-11-6	1,29E-02	kg	1,52E-06	Calculado usando PestLCI	
Fosmet	Agua superficial	732-11-6	9,66E-06	kg	1,14E-09	Calculado usando PestLCI	
Fosmet	Agua subterránea	732-11-6	7,00E-05	kg	8,24E-09	Calculado usando PestLCI	
Fludioxonil	Aire	131341-86-1	2,25E-03	kg	2,65E-07	Calculado usando PestLCI	
Fludioxonil	Agua superficial	131341-86-1	2,75E-02	kg	3,24E-06	Calculado usando PestLCI	
Fludioxonil	Agua subterránea	131341-86-1	1,20E-02	kg	1,41E-06	Calculado usando PestLCI	
Oxícloruro de Cobre	Aire	1332-40-7	0,00E+00	kg	0,00E+00		
Oxícloruro de Cobre	Agua superficial	1332-40-7	0,00E+00	kg	0,00E+00		
Oxícloruro de Cobre	Agua subterránea	1332-40-7	0,00E+00	kg	0,00E+00		
Arándanos (CL)   VIII Región			8500	kg	1,00E+00		

Grupo IV: Materialidad						
17	Balance de masa y energía en línea con el objetivo y alcance	La diferencia en el balance es evaluada en relación a la suma de entradas o salidas, (dependiendo qué valor es mayor) como a continuación:	Nivel de dataset	1 - Balance de masa y energía en línea con el objetivo y alcance		
		$\Delta m = ( m_i - m_o )/\max(m_i, m_o)$		2 - Balance de masa y energía mayormente en línea con el objetivo y alcance (e.g. $\Delta x < 5\%$ )		
		$\Delta e = ( e_i - e_o )/\max(e_i, e_o)$		3 - Balance de masa y energía parcialmente en línea con el objetivo y alcance (e.g. $\Delta x < 15\%$ )		
		Con: "mi": suma de los flujos de entrada de masa "mo": suma de los flujos de salida de masa "ei": suma de los flujos de entrada de energía "eo": suma de los flujos de salida de energía		4 - Balance de masa y energía NO está mayormente en línea con el objetivo y alcance (e.g. $15\% \leq \Delta x \leq 75\%$ )		
				5 - Balance de masa y energía NO está en línea con el objetivo y alcance (e.g. $\Delta x > 75\%$ )		
18	Resultados de LCIA en línea con el objetivo y alcance	Este criterio se refiere a la completitud de los resultados de LCIA en relación a las categorías de impacto y métodos declarados en el objetivo y alcance	Nivel de dataset	1 - Resultados de LCIA completos en relación al objetivo y alcance		
				5 - Resultados de LCIA NO completos en relación al objetivo y alcance		
19	Orden de los 5 principales factores de los principales resultados de LCI en línea con el objetivo y alcance	Este criterio evalúa si el orden, i. e. el ranking de orden por cantidad, de los principales resultados de LCIA está en línea el objetivo y alcance.	Nivel de dataset	1 - Orden de los 5 principales factores de los principales resultados de LCIA en línea con el objetivo y alcance		
				5 - Orden de los 5 principales factores de los principales resultados de LCIA NO están en línea con el objetivo y alcance		
Grupo V: Información procedimental y meta-información						
20	Cantidad de revisores y su relación con el proveedor de datos	Este criterio sirve para referenciar si el dataset ha sido críticamente revisado y cómo, según diferentes esquemas de revisión	Nivel de dataset	1 - Uno o más revisores externos independientes		
				2 - Dos o más revisores internos independientes		
				3 - Un revisor interno independiente o dos o más revisores internos		
				4 - Un revisor interno		
				5 - No se han realizado revisiones		
21	Acceso a los datos	Este criterio se refiere al grado de posibilidad de revisar datos y modelos subyacentes de un dataset agregado parcial o totalmente	Nivel de dataset	1 - Acceso completo al modelo de cadena de suministro		
				3 - Acceso limitado al modelo de cadena de suministro		
				5 - Sin acceso al modelo de cadena de suministro		



# Discussion

---

**Instructions:** Choose one person of each group to present the results of the assessment.

- Which difficulties did you encounter?

Having in mind the Peruvian LCI Database:

- What is the current state of datasets with regards to the criteria you used?
- What are their strengths and weaknesses?
- What are the expectations for future datasets and the development of the database in terms of data quality?
- Q&A

# Part 6 - Roadmapping for the Peruvian National Database

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Content from: Bruce Vigon, Breveja Environmental, the Government of Thailand and CILCA

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## Disclaimer

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# Segment Outline

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## Introduction

Summary of previous activities in the country

National life cycle databases creation and expansion

## Mainstreaming

What are the needs (industry, government, NGOs)?

Priority sectors

Who could do what and when?

**Roadmap Plan: Infrastructure, format, ownership, governance, activities**

## Database part

Further detailed planning of next steps:

- What does exist? First datasets to be created? Or adapted? What are the core datasets for the country?
- What kind of database will it be and which database protocol?
- How will the national database be interoperable and able to share datasets outside the country?
- Who manages the database? Who is doing what in the short term?

**Roadmap Plan: Decisions on and development of mechanism to generate datasets and set up the database itself**

Business plan for initial setup...for long term operations...for updates and upgrades

# Foundation

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- Dr. Ian Vázquez-Rowe, M.Sc. Isabel Quispe, B.Sc. Alessandro Gilardino
- | Commissioned by UNEP to the PUCP | December 1, 2015

## Regional Stakeholder Consultation on LCA Databases in Latin America

Based on Session on 'Regional Roadmap towards the Development of LCA Databases'. 14 July 2015. In conjunction with the CILCA 2015 Conference.

Pontificia Universidad Católica del Perú. Av. Universitaria 1801, San Miguel. Lima, Perú

# CILCA 2015 Take-Aways

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- The **stated main aim of the consultation document** was the building of a roadmap towards the development of a regional database structure for the Latin-America – Caribbean (LAC) region, and also integration of these experiences with those occurring in the remaining areas of Ibero-America, i.e., Spain and Portugal.
- Should be **nourished by the construction of quality nationally-based databases** and should aim at harmonizing in the medium term the different velocities that nations have developed when building these databases.
- Partnering -- **internationalization project led and funded by ecoinvent** ([www.sustainable-industries.org](http://www.sustainable-industries.org)) and supported by Quantis, which includes a formal review of the data which afterwards will be available in the national databases of the countries' providers as well as ecoinvent.
- **Sharing of experiences**

# Plan – Post-CILCA 2015

- For nations in Group II (including Peru) the development of an action plan with stakeholders in each country (i.e., authorities or other actors linked to strategic sectors in the economy) will be necessary.
- Furthermore, the development of at least databases in three countries should be initiated with national datasets for one or more priority sectors.
- The Peruvian LC network (PELCAN) offered to engage PROMPeru and the Ministry of Environment of Peru. Concrete plans of the Peruvian Life Cycle Network were committed to be developed by March 2016.



## Timing – Post-CILCA 2015

- For other nations that have developed an LCA network (i.e. *Group II*).
- Results regarding training, engagement of government institutions and research should be presented at CILCA 2017

Activity	2016												2017			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
Engage government inst.																
Research in new sectors																
First workshop																
Second workshop																

# CILCA 2015 - Results and Recommendations

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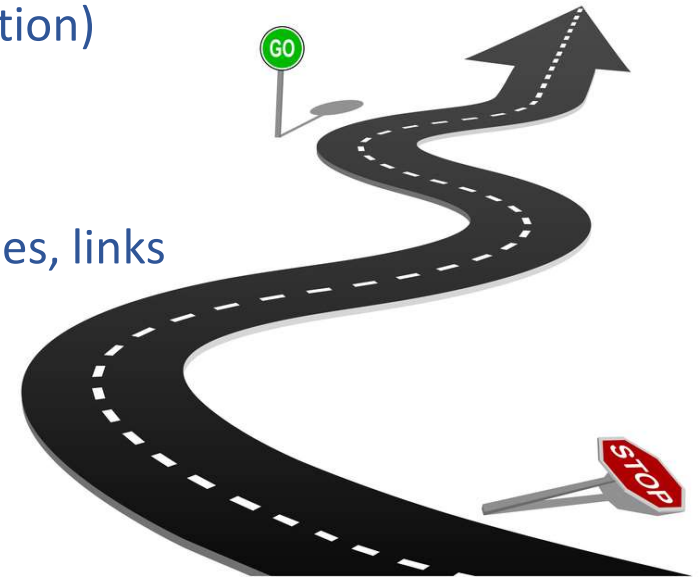
- **Starting with national databases** was seen as a more realistic option. Furthermore,ecoinvent suggested to start with the priority sectors (for example, based on share of GDP and on most exported products' clusters) and apply a companies' rating system that ranks at the top the ones reporting to the national database.
- Create **synergies among the most active sectors** such as mining, construction, food and energy to have compatible data. Focus the first efforts of data collection in energy, construction and export markets.
- **Data quality** of key products and materials is also key.
- **Dataset creation**: Which LCA data to use, especially LCA data which are not (yet) integrated in LCA databases.
- The **opportunity of exploiting national registries** to generate datasets was also mentioned, following models of extrapolation.
- **Translate national statistics** into LCA datasets by using conversion tools which can be shared in the region.
- Global Network on Interoperable LCA Databases (GLAD) to **organize the entering of raw data and datasets** into national databases.



# Elements of a roadmap document

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- Infrastructure, format, ownership and governance
- Stakeholders engagement and priority sectors
- List of mainstreaming activities
- Datasets to be covered (including order of priority)
- Proposed strategy for datasets development (adaptation, creation)
- Data intellectual property issues, if any
- Structure and protocol of database
- International dimension: interoperability with existing databases, links to ongoing international efforts, i.e. GLAD
- Business plan
- Roadmap with timelines and milestones



# Database Part of Roadmap

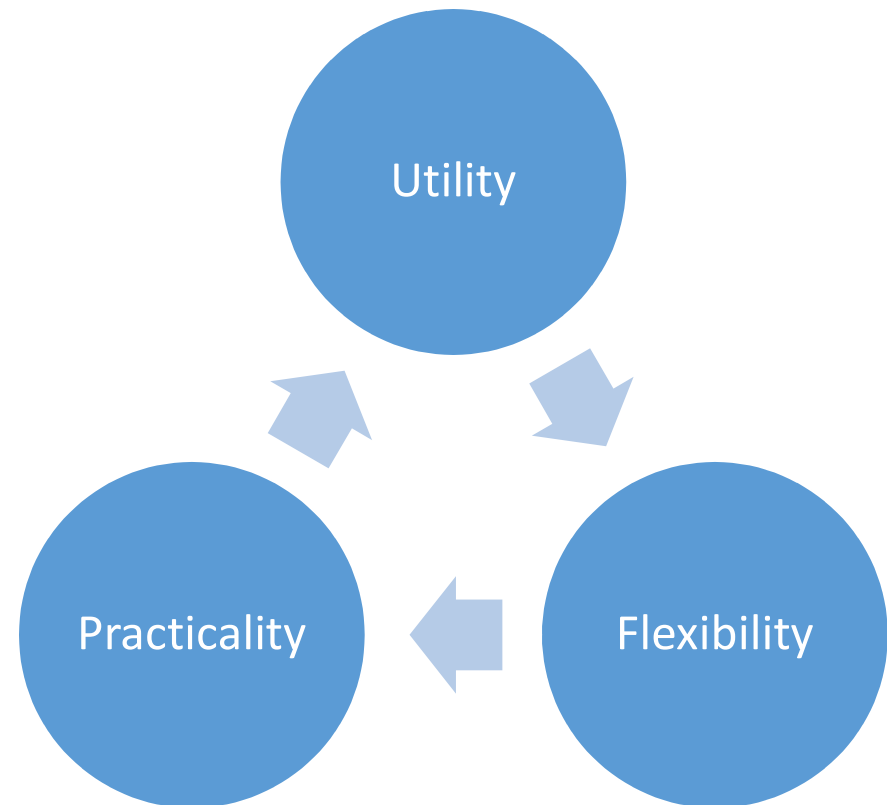
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- What does exist? Datasets to be created? Or adapted? What are the core datasets for the country?
- What kind of database will it be and which database protocol?
- How will the national database be interoperable and able to share datasets outside the country?
- Who manages the database? Who is doing what in the short term?
- Decisions on and development of mechanism to generate datasets and the database itself (structure as integral to existing system or stand-alone, core datasets, kind of database and protocol, database manager, etc.)
- Initial business plan for initial setup...for long term operations...for updates and upgrades (finances and who does what)

# Data Providers

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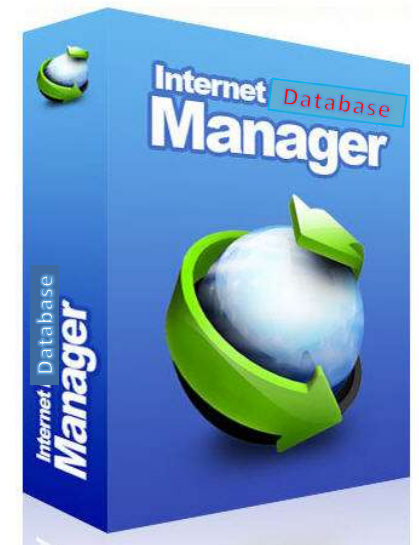
- Who are they?
- Do they submit raw data to be assembled into datasets by the database manager and then validated?
- How are these submittals quality controlled?
- Or, are they expected (or required) to submit datasets (including required meta-data for documentation, which could also be verified?
- How (or if) they work with the developers and managers or just conform to the protocol



# Database Developers & Managers

---

- Decide all or only some (in consultation with stakeholders) elements of the protocol
- How to best work with data providers – including developing data collection templates
- How to best support users, both nationally and internationally
- Developing a budget and securing funding (could be in concert with an LCA Network)



# Specify Actions and Milestones

Action/Milestone	Short term (0-3 years)	Medium term (3-7 years)	Long term (>7 years)
Create a decision tree for the selection of impact categories for a particular application, and instructions for how to document the choice			
Identify a method to handle impact categories where the differences are not clear due to uncertainty			
Identify a method to normalize results to highlight which categories are most important to the decision			
Identify a method (or methods) to assess tradeoffs that works for those familiar with LCA			
Create a decision tree to select a method (if more than one identified), and instructions for how to document the choice			
Identify a method (or methods) to assess tradeoffs that works for those not familiar with LCA			
Create a decision tree to select a method (if more than one identified), and instructions for how to document the choice			
Identify a method (or methods) to assess tradeoffs including social and economic impacts that works for those familiar with LCA			
Create a decision tree to select a method (if more than one identified), and instructions for how to document the choice			
Identify a method (or methods) to assess tradeoffs including social and economic impacts that works for those not familiar with LCA			
Create a decision tree to select a method (if more than one identified), and instructions for how to document the choice			
Identify data presentation techniques that work for those familiar with LCA			
Create a decision tree to help in the selection of data presentation techniques			
Identify data presentation techniques that work for engineers (including those not familiar with LCA)			
Create a decision tree to help in the selection of data presentation techniques			
Identify data presentation techniques that work for executives and/or policy makers			
Create a decision tree to help in the selection of data presentation techniques			
Identify data presentation techniques that work for consumers			
Create a decision tree to help in the selection of data presentation techniques			

# Experiences and Recommendations from Thailand

- View file:  
8b\_Database  
roadmapping\_key  
considerations\_Th  
ailand\_11-17



# Objectives – Questions to address

---

## Addressing the following --

### Mainstreaming

- Define and confirm the needs (industry, government, NGOs)?
- Where are we now (specify the starting point)?
- Is the national life cycle network sufficiently active?
- Who is planning to do what in the short term?
- Which sectors are active and which need to be activated?
- Where do we need to go (destination goal and objective)?
- Who could do what and when?

### Development of national LCI database

- Which datasets exist?
- What are the core datasets for the country?
- Should datasets be created or adapted?
- Who needs to be involved and when?
- Who could be the database manager?
- How to connect regionally or internationally?

# Classroom Exercise – Building the Roadmap

---

## Roadmap Creation Process:

1. Divide into smaller groups according to the following roadmap elements/activity tracks - a. Data, Datasets & Quality Assurance, including Review; b. Global Network Connection and Database Structure/Setup/Operations; c. Mainstreaming, Communications and User Support; and d. Governance and Management, including Business Planning and Funding.
2. Create an activity-based timeline for your track. Use the colored Post-It Notes assigned to your group. Begin with 2018 and explicitly include all activity for each year through 2022. If an activity extends beyond 2022, show it as “2022+” .
3. Show all critical milestones (achievements and deliverables) and identify key actors and their relationships.
4. Show all dependencies internal to your activity track with arrows.
5. Once the track is completed, consider any inter-activity connections to be added to the composite roadmap.
6. Select one member of the group to spend up to 10 minutes explaining your activity track and moderating the full group discussion, including answering any questions from the other groups.
7. Add cross-connection arrows as needed.
8. Spend up to one hour discussing the overall results and next steps.



# **Thai National LCI Database**

**Life Cycle Assessment (LCA) Lab**  
**National Metal and Materials Technology Center (MTEC)**  
**National Science and Technology Development Agency (NSTDA), Thailand**

**29 November 2017**

**Thai National LCI Database**

**1**

**Thai LCI Dataset Roadmap**

**2**

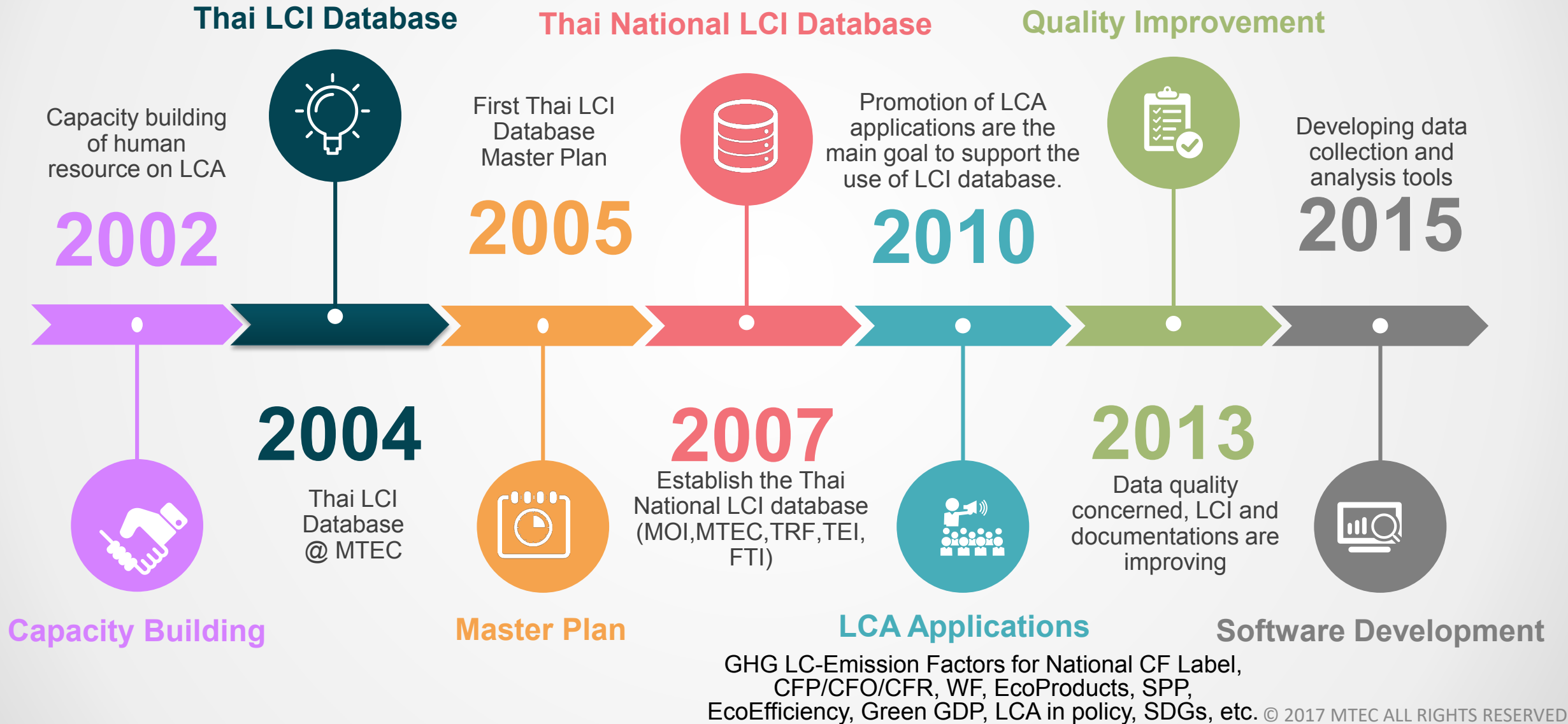
**Software for Thai LCI Database**

**3**

**Stakeholder Encouragement**

**4**

# Thai National LCI Database Development Pathway



# Thai Data Center Management



Establishment of national LCI database development committee



Development of data format and data collection method and design system boundary



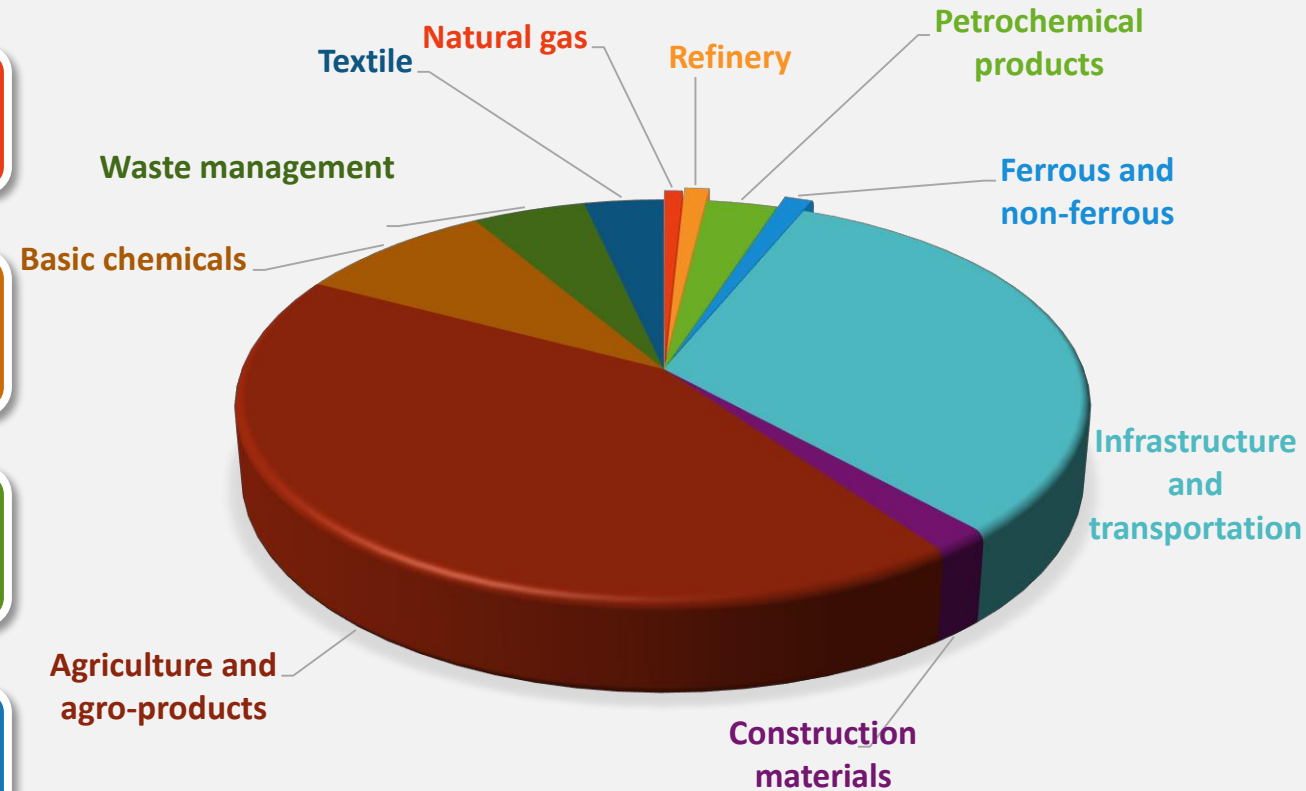
Management of system and database



Development of Thai LCI guidance



Promotion of Thai database and its services



**Datasets in Thai LCI Data Center  
(1,484 datasets)**

Last update Nov. 2017

# Components of Thai National LCI Database

## Budget

- NSTDA, Ministry of Science and Technology (MOST) → 2003
- The Thai Research Fund (TRF) → 2005
- Ministry of Industry → 2007
- NSTDA, Ministry of Science and Technology (MOST) → 2012 to present



## Committee

- Steering Committee
  - Verification and certification committee → 2009
  - Development committee → 2011
- Technical and Development Committee → 2010
- Working Group
  - Database management supporting → 2011



## International technical assistance/ collaboration

- Japan Government
  - Green Partnership Plan
- European Commission
  - Joint Research Center (JRC)
- UN Environment
  - Life cycle initiative



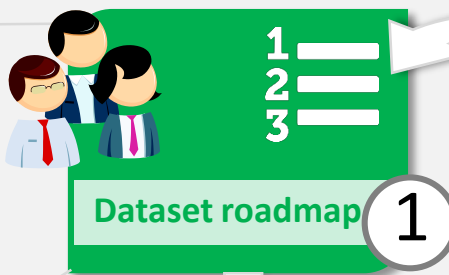
# Dataset Roadmap



# Thai LCI Development

## Dataset road can be revised:

- The roadmap will be **revised annually**
- **Budget** allocation
- Dataset **priority**
- **Partner** available



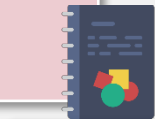
Requires update

## Create dataset

- Establish partner to collect data
- Define system boundary, data collection method and representative
- Collect data
- Develop LCI
- Validate LCI data



2.1



LCI guidance

NO

Existing data

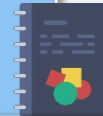
YES

## Update dataset



2.2

- Review dataset: time and technology changed
- Establish partner to collect data
- Define system boundary, data collection method and representative
- Collect data
- Develop LCI
- Validate LCI data



LCI guidance

## Review & revise

- At least **twice a year**
- Inventory check
- Update background data
- Time and technology changed



7

Users

Public datasets

6

All dataset needs validation and quality control

## Validation:

- System boundary
- Functional unit
- Inventory
- Allocation
- Mass/Water/Energy balance
- Reference flow
- Completeness
- Documentation
- Etc.



PASS

Central Data Center

5

National database

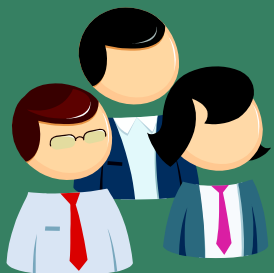
Pilot database

FAIL

External

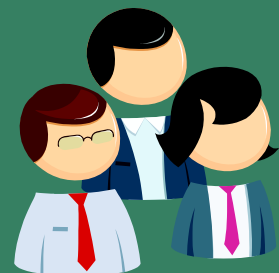
# Thai LCI Development Actors

Internal



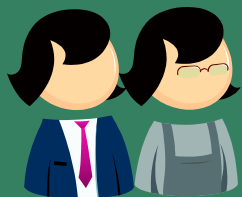
## Steering committee

Approve the roadmap and establish technical committee



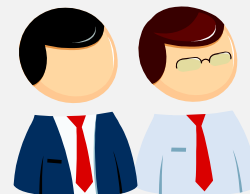
## Technical committee

Participate in the critical third party LCA review



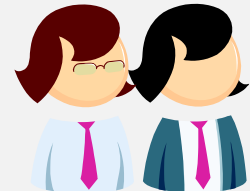
## Partner/LCA expert

Design data collection method, also work with LCI data developer for developing LCI database which follow the guidelines



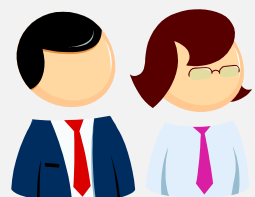
## LCI data developer team

Identify system boundary and representative of dataset. Also, partner selection to develop LCI data



## Internal reviewer

Validate the quality of LCI dataset and control and define the LCI quality standard



## QA team

Correct the mistake of dataset, and maintain the quality of data. Review the data availability.



# Software for Thai LCI Database

**DALA:**  
Web-based collaboration tools

2015



(beta version)



SimaPro



thinkstep  
GaBi



JEMAI-Pro

umberto®  
know the flow.

Central Data Center

National  
database

Pilot  
database



First implementation

Software selection

Stop using JEMAI-Pro

SimaPro

- JEMAI-Pro

- Umberto
- GaBi
- SimaPro

- SimaPro
- GaBi

- SimaPro
- GaBi

2007

2008

2010

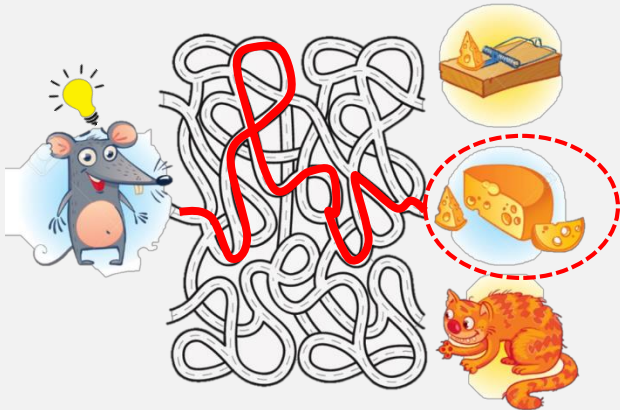
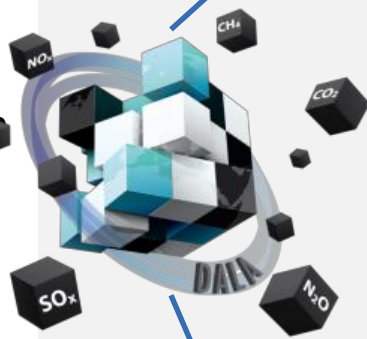
2012

2017

# Web-based Collaboration Tools: DALA (beta version)

## Targets problem

- **Fragmented**
  - Data
  - Collection ≠ Association
  - Node
  - Intermedia data source
- **No expert in field**
  - Lack of understanding
  - Do not know how to start



## features

- **Graphic User Interface**
- **Dataset development**
- **Documentation**
- **Validation**
  - Functional unit
  - Allocation
  - Mass/Water/Energy balance
  - Reference flow
- **Data quality**
- **Process status**
- **Security control**
- **User roles**
- **Duplicate data**
- **Interoperability**

- **Reliability**
- **Standard conformance**
- **Transparency**
- **LCI data harmonization**
- **Guided system**

**Supports GLAD**

## Stakeholder Encouragement (2017)

### 01 Encourage industry on environmental friendly

**113 companies** registered carbon footprint for organization

### 03 Support information that is needed to benchmark and evaluate performance

**~20 Projects** for support scientific data

### 04 Support governmental policy

**17 governmental policies** supported technical information from Thai LCI Database.

### 02 Environmental information in consumers decision making

**88 companies (550 products)** registered carbon footprint for product

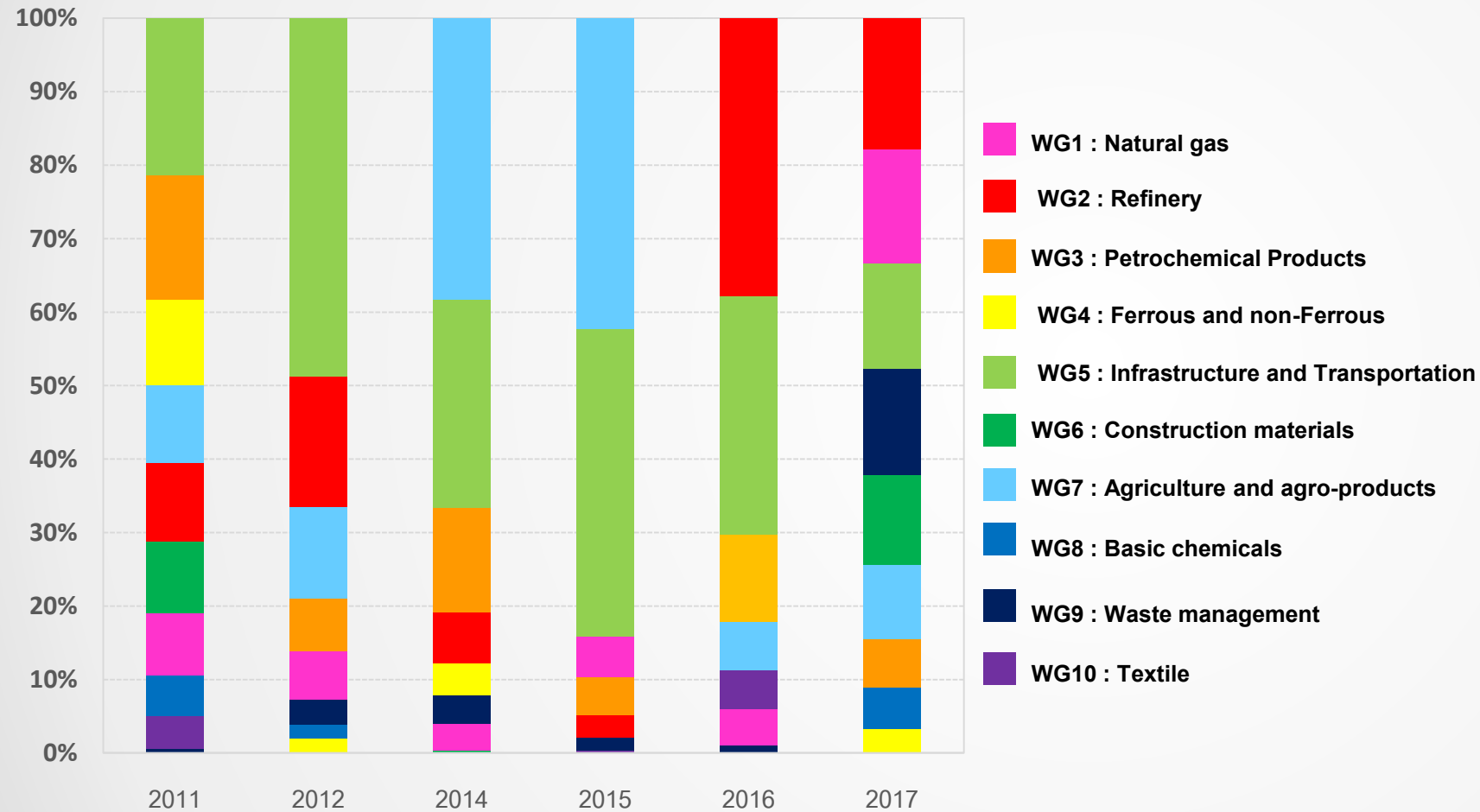
**53 companies (240 products)** registered carbon footprint reduction

**33 companies** registered Carbon Reduction

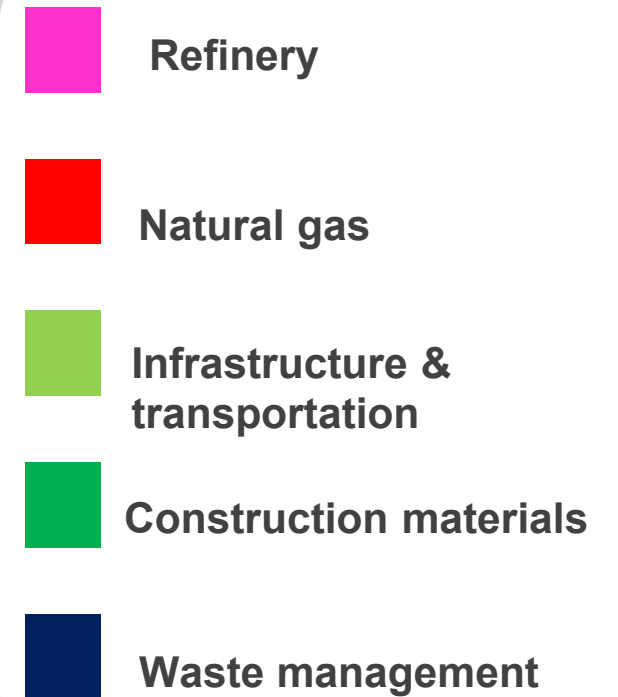
### 05 Support scientific data for green supply chain implementation

**531 Emission factors** for Support scientific data for green supply chain implementation

# Service of Thai LCI Database



## 2017, top LCI requests



“Data shown only through website requests”

# Government supporting is the most important



Government  
Support

It will take enormous resources..



Powerful tool and software are required, also LCA expert.



Complex and large data is used through the supply chain.



Collaboration is needed for data development.



“Secondary data may  
be an alternative to  
LCI development”

NSTDA, National Infrastructure Programme, mainly supports for Thai LCI Data Center activities. LCI data is one of the most significant infrastructure for a country's progress in the modern and green economy.

# Critical to Success!

## National plan and strategy

- Decoupling natural resource use and environmental impacts from economic growth are concerned
- LCT and LCI have been included in National Environmental Management Plan

## Stakeholder Involvement

- A strong contribution to maintain the national LCI
- Builds productive collaboration within and across a variety of sectors, including government, industry, university, and people

## Finances and resources

- Robust financial management
- An effective team is the most significant to develop and manage LCI, also powerful tool

## Research and innovation

- LCI as scientific environmental management tool, needs to ensure that reliability, accuracy and validity
- Research to improve the quality of LCT applications to promote environmental awareness

# Thai LCA Collaboration: Thailand Organisations

## Government sector

- Greenhouse Gas Management Organization (TGO)
- Thailand Research Fund (TRF)
- Iron & Steel Institute of Thailand
- Thailand Textile Institute (THTI)
- Provincial Waterworks Authority (PWA)
- Department of industrial works (DIW)
- Pollution Control Department (PCD)
- Department of Livestock Development (DLD)
- Office of Agricultural Economics (OAE)
- Department of Mineral Fuels
- Rice Department
- Department of Fisheries
- Etc.

## NGO

- Thailand Environment Institute (TEI)

# Thai LCA Collaboration: Thailand Organisations

## Private sector

- Petroleum Authority of Thailand (PTT)
- Siam Cement Group (SCG)
- Charoen Pokphand (CP) Group
- BETAGRO
- Bangchak Corp
- Etc.

## Education

- Kasetsart University
- Thammasat University
- Joint Graduate School of Energy and Environment (JGSEE)
- Chiang Mai University
- Chiang Mai University
- University of Phayao
- Mahidol University
- Chulalongkorn University
- Etc.



# Thai LCA Collaboration: International Organisations



# THANK YOU

**Life Cycle Assessment (LCA) Lab**  
**National Metal and Materials Technology Center (MTEC)**  
**National Science and Technology Development Agency (NSTDA), Thailand**

# Thank you

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Training on Dataset Development,  
Documentation and Exchange

**Managed by SETAC**

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