CHALMERS

Quick guide when switching data documentation format from SPINE to ISO/TS 14048

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Purpose of this report

The purpose of this report is to facilitate for persons familiar with LCI data documentation using the SPINE format to easily switch to the ISO/TS 14048 data documentation format. The aim is both to facilitate for SPINE users to start to work with documentation in ISO/TS 14048, and to facilitate how to interpret SPINE-formatted data sets that have been imported into the ISO/TS 14048 data documentation format. The report is intended as a practical complement to CPM report 2003:8 [1], the technical report that describes the mapping of SPINE format to ISO/TS 14048 data documentation format.

It is assumed that the reader of this report is well familiar with the LCI-part in the SPINE data documentation format and the interpretation and meaning of each data field according to SPINE. The meaning of the data fields in SPINE is based on the CPM data documentation criteria, and thus knowledge of the criteria is good to have but not necessary to the understanding of the report.

This report has been developed as part of the work to translate SPINE tools and material into the ISO/TS 14048 data documentation format. Other reports developed as part of this work is:

- Flemström K., Pålsson A-C. " Introduction and guide to LCA data documentation using the CPM documentation criteria and the ISO/TS 14048 data documentation format" CPM report 2003:3
- Flemström K, Pålsson A-C. "An interpretation of the CPM data quality requirements in terms of ISO/TS 14048 data documentation format", CPM-report 2003:4
- Carlson R., Erlandsson M., Flemström K., Pålsson A-C., Tidstrand U., Tivander J. "Data format mapping between SPINE and ISO/TS 14048", CPM-report 2003:8

The ISO/TS 14048 data documentation format

ISO/TS 14048 data documentation format is a standardised format for LCA data, which can be used in paper-based or electronic media [2]. It outlines and specifies a form for different users to report LCA data, e.g. within industries, institutes, consultancy agencies etc. The format supports transparent reporting, interpretation and review of data collection, data calculation, data quality and data reporting, as well as facilitates data exchange. It can be used as a template for standard compliant and compatible designs of e.g. data forms, questionnaires, database systems and electronic communication systems.

ISO/TS 14048 describes the data documentation format for LCI (life cycle inventory) as described in ISO 14041. It is thus developed for life cycle assessment, but can also be used to support environmental data management when applying other standards in the ISO 14000 series. ISO/TS 14048 enables fully transparent, and hence fully reviewable and verifiable data documentation for e.g. complete life cycle inventories, individual plants, and production lines.

The format prescribes and structures relevant aspects of documentation of LCA data. In regards of LCI data, i.e. data about technical activities, the relevant aspects focus around models of processes and their environmental properties. Such a model is in the

ISO/TS 14048 document referred to as a process. The format is based on the requirements and guidance on LCI as described in ISO 14041 and is compatible with the international standards for impact assessment (ISO14042) and interpretation (ISO 14043).

The data documentation of a process is in ISO/TS 14048 structured in three parts (see figure 1):
- Process, which includes the process description and the normalised set of inputs and outputs
- Modelling and validation
- Administrative information

Each part is divided in subsections, which further specify the information. When specifying the data fields in this report, the first name is the set of data fields to which the data field belong, the second and third is a further specification of were to find this field in the format e.g. Process – Process description.
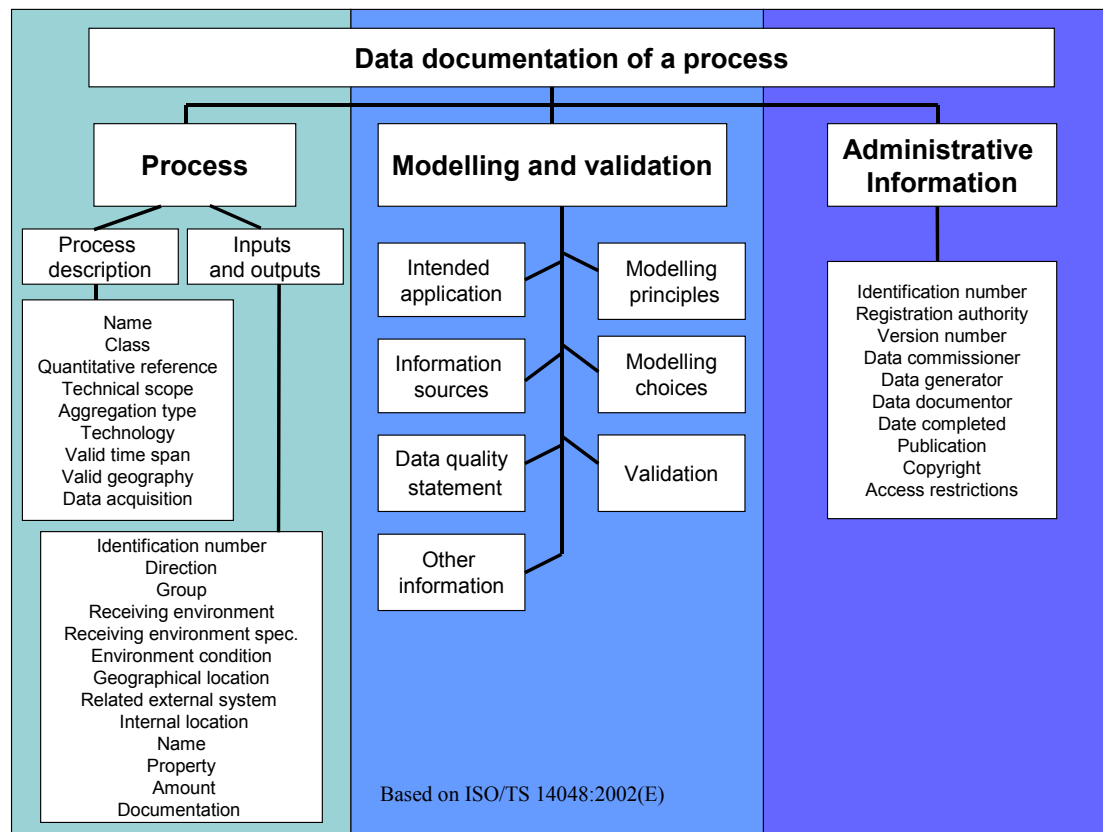
Data documentation of a process

| Process | Modelling and validation | Administrative Information |

Process description / Inputs and outputs

Name
Class
Quantitative reference
Technical scope
Aggregation type
Technology
Valid time span
Valid geography
Data acquisition

Identification number
Direction
Group
Receiving environment
Receiving environment spec.
Environment condition
Geographical location
Related external system
Internal location
Name
Property
Amount
Documentation

Intended application / Modelling principles

Information sources / Modelling choices

Data quality statement / Validation

Other information

Based on ISO/TS 14048:2002(E)

Identification number
Registration authority
Version number
Data commissioner
Data generator
Data documentor
Date completed
Publication
Copyright
Access restrictions

Figure 1. Illustration of structure of the major part in the ISO/TS 14048 data documentation format (based on ISO/TS 14048)

Aspects to consider when switching data documentation format

When switching data documentation format from SPINE to ISO/TS 14048 there are some aspects that one needs to be aware of, due to e.g. the level of specification of the information in the two formats. The following issues needs to be handled:

1. *One data field in SPINE have exactly the same interpretation in ISO/TS 14048,* i.e. the meaning of the ISO/TS 14048 field is identical with the corresponding SPINE field.
2. *One data field in ISO/TS 14048 has a broader interpretation than the corresponding data field in SPINE,* i.e. the meaning of the fields in the two formats is similar, but the field in ISO/TS 14048 has a broader range of applicability.
3. *One data field in SPINE is specified by a set of ISO/TS 14048 fields*, i.e. information that is documented in free text fields in SPINE are documented through a number of data fields in ISO/TS 14048. For example the free text field FunctionalUnit in SPINE corresponds to four data fields in ISO/TS 14048; Quantitative reference: Type, Name, Amount and Unit.
4. *A set of data fields in SPINE are specified by one field in ISO/TS 14048*, i.e. information that is documented in a set of data fields in SPINE are documented in a free text field in ISO/TS 14048. For example, the meaning of the SPINE-data fields Intended User, General Purpose and Detailed purpose corresponds to the ISO/TS 14048 data field Intended application.
5. *One data field in SPINE has no direct correspondence to a data field in ISO/TS 14048,* i.e. information that is specified explicitly in SPINE is not explicitly specified in ISO/TS 14048. This does not however mean that the information cannot be documented and stored in ISO/TS 14048. In such cases, the information is documented in the ISO/TS 14048 data field that is closest in meaning.
6. *One data field in ISO/TS 14048 has no direct correspondence to a data field in SPINE,* i.e. the information according to ISO/TS 14048 is not explicitly specified according to ISO/TS 14048, and that is not directly related to CPM's data documentation criteria. These data fields are described in the section "Additional or more detailed information in ISO/TS 14048 compared to SPINE". It is important to stress, however, that when importing an ISO/TS 14048 data set into a SPINE information system, information in these data fields will not be lost, but will be imported into a SPINE data field that is closest in meaning. This is also described in this section.

For some data fields there are some differences between manual and electronic mapping, due to the level of specification of information in the formats. In electronic mapping, information in e.g. a free text field cannot be transferred into a set of data fields, without manual interpretation and restructuring of the information by a person. For example, the SPINE data field "FunctionalUnit" (free text) corresponds to the ISO/TS 14048 set of data fields named "Quantitative reference" that consists of four data fields.

Switching data documentation format from SPINE to ISO/TS 14048

The following guide for switching data documentation format from SPINE to ISO/TS 14048 is presented based on the CPM data documentation criteria and the interpretation of SPINE that are specified by the criteria. The CPM data documentation criteria are a quality agreement that specifies what information that should be documented in order for a data user to be able to assess the applicability of a data set in e.g. LCI studies. The CPM data documentation criteria was originally specified in terms of the SPINE data documentation format [3], but can equally well be used with ISO/TS 14048. Documentation according to CPM's data documentation criteria can be divided into six sections [4]. To fulfill the criteria all parts should be documented. Each section of the criteria can be expressed in SPINE as well as in ISO/TS 14048 data documentations fields. Figure 3 below illustrate where the different sections of the criteria are documented in SPINE and ISO/TS 14048 respectively.
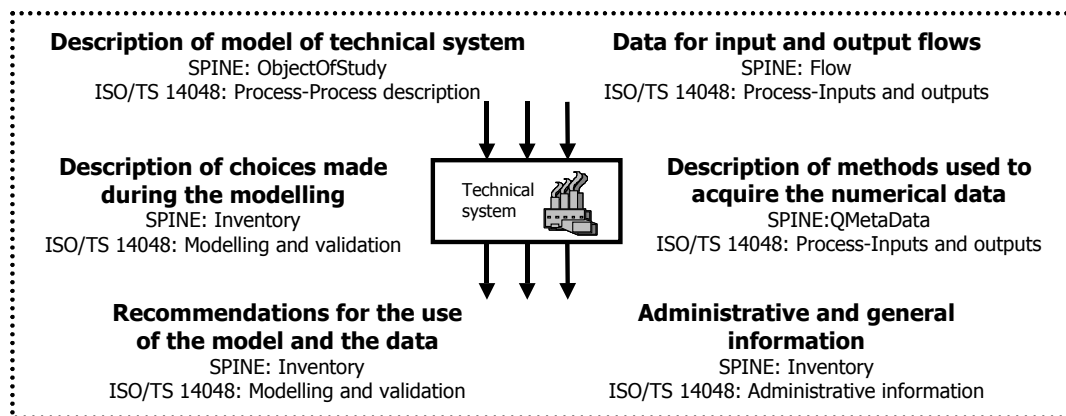
Figure 3. Documentation of a model of a technical system according to the CPM data documentation criteria in terms of SPINE and ISO/TS 14048 data documentation format

A detailed description of how the CPM data documentation criteria is expressed in terms of the SPINE format, is found in CPM reports 1997:1, 1999:1 and [3],[4],[5]. A detailed description of how the CPM data documentation criteria is expressed in terms of the ISO/TS 14048 format is found in CPM reports 2003:3 and 2003:4 [6],[7]

The table below illustrates how SPINE-concepts are translated and interpreted into concepts in the ISO/TS 14048 data documentation format. The order of the SPINE-data fields in the table is based on the order in which they are presented in CPM report 1991:1 [4]. In the column "Comment" it is indicated how the SPINE data field have been translated into ISO/TS 14048, based on the aspects presented above. A brief description of how to interpret the ISO/TS 14048 data fields is provided in Appendix 1.

Table 1: Guide when switching from SPINE format to ISO/TS 14048 data documentation format

SPINE data documentation format - data fields	ISO/TS 14048 data documentation format - data fields	Comment
Description of the technical system (ObjectOfStudy)	***Process - Process description***	The information in SPINE Object of study corresponds to ISO/TS 14048 Process – Process description
Name	Name	Same interpretation
Type of technical system (Category)	Technical scope	Same interpretation
Sector	Class - Name Class - Reference to nomenclature	Broader interpretation in ISO/TS 14048 In ISO/TS 14048 more than one classification of the process may be supplied.
Geographical location (Site)	Valid geography – Sites	Same interpretation See also the SPINE data field GeographyBoundary.
Description of the technical system content (Function)	Technology - Technical content and functionality	Same interpretation and Set of SPINE fields in one ISO/TS 14048 field (See SPINE data fields Owner, FunctionalUnit and FUExplanation).
	Technology - Short technology descriptor	One SPINE field in set of ISO/TS 14048 data fields In manual mapping the *Short technology descriptor* corresponds to a short abstract in *Function*. In electronic mapping the *Short technology descriptor* corresponds to the *ActivityType*, i.e. if the activity is a Process or Transport.
Owner	Technology - Technical content and functionality	No direct correspondence in ISO/TS 14048 *Owner* has no direct correspondence in ISO/TS 14048, but can be documented in *Technical content and functionality*. Set of SPINE fields in one ISO/TS 14048 field (see also SPINE-data fields Function, FunctionalUnit and FUExplanation)
Description of choices made during the data acquisition and the objective for the choices (Inventory)	***Modelling and validation***	The information in SPINE Inventory largely corresponds to the information in ISO/TS 14048 Modelling and validation, and Administrative information, with some minor exceptions.
Purpose of the data acquisition		
Intended User	Intended application	Set of SPINE fields in one ISO/TS 14048 field
General Purpose	Intended application	Set of SPINE fields in one ISO/TS 14048 field
Detailed Purpose	Intended application	Set of SPINE fields in one ISO/TS 14048 field

SPINE data documentation format - data fields	ISO/TS 14048 data documentation format - data fields	Comment
Persons responsible for the data acquisition		
Practitioner	Administrative information - Data generator	Same interpretation Please note that this information is supplied in the *Administrative information* part in ISO/TS 14048.
Reviewer	Validation - Validator	Broader interpretation in ISO/TS 14048 In ISO/TS 14048 different types of validations that have been performed on the data set can be described in detail (see the next section).
Commissioner	Administrative information - Data commissioner	Same interpretation Please note that this information is supplied in the *Administrative information* part in ISO/TS 14048.
Choice of functional unit		

FunctionalUnit	*Manual mapping:* Process – Process description - Quantitative reference
	    - Type
	    - Name
	    - Unit
	    - Amount
		One SPINE field specified by a set of ISO/TS 14048 fields
		
		In manual mapping the information in the SPINE data field FunctionalUnit can be documented in Quantitative reference.

	Electronic mapping: Process – Process description - Technology - Technical content and functionality	When a SPINE data set is electronically mapped to ISO/TS 14048 the information in FunctionalUnit will be included in *Technical content and functionality*, due to that the information in SPINE is not structured in the same way in ISO/TS 14048.
Explanation of Functional Unit (FUExplanation)	Process – Process description - Technology - Technical content and functionality	No direct correspondence and Set of SPINE fields in one ISO/TS 14048 field (see also SPINE data fields Function, Owner and FunctionalUnit) There is no direct correspondence to this SPINE data field in ISO/TS 14048. However, since the explanation of the functional unit is important for the interpretation, the information should be supplied.
Choice of system boundaries		
System boundaries towards the environmental system (NatureBoundary)	Modelling choices - Criteria for excluding elementary flows	Same interpretation

System boundaries in time (TimeBoundary)	Process - Process description - Valid time span
	    - Time span description
	    - Start date
	    - End date
		One SPINE field specified by a set of ISO/TS 14048 fields.
		
		Start date and *End date* is only used in manual mapping
		
		Please note that this information is supplied in the *Process* part in ISO/TS 14048.

SPINE data documentation format - data fields	ISO/TS 14048 data documentation format - data fields	Comment
Geographical system boundaries (GeographyBoundary)	Process - Process description- Valid geography - Area description - Area name	One SPINE field specified by a set of ISO/TS 14048 fields. *Area name* is only used in manual mapping. Please note that this information is supplied in the *Process description* part in ISO/TS 14048.
Other system boundaries (OtherBoundary)	Modelling choices - Criteria for excluding intermediate product flows - Criteria for externalising processes	One SPINE field specified by a set of ISO/TS 14048 fields. In manual mapping the information may be documented in the appropriate ISO/TS 14048 data field, depending on the content of OtherBoundary. In electronic mapping, all information in OtherBoundary will be included in *Criteria for excluding intermediate product flows*
Description of allocations (Allocations)	Modelling choices - Allocations performed - Allocation explanation - Allocated co-products	One SPINE field specified by a set of ISO/TS 14048 fields. *Allocated co-products* is only used in manual mapping
Systems expansions (LateralExpansion)	Modelling choices - Process expansion – - Process expansion explanation, - Process included in expansion	One SPINE field specified by a set of ISO/TS 14048 fields. *Process included in expansion* is only used in manual mapping
Input and output flows (Flow)	*Process - Inputs and outputs*	The information in SPINE Flow corresponds to ISO/TS 14048 Process – Inputs and outputs
FlowNumber	Identification number	Same interpretation
Direction	Direction	Same interpretation
Type of flow (FlowType)	Group	Same interpretation
Substance (Substance - DefaultName)	Name – Name text	Same interpretation
Substance Notes (Substance - Notes)	Name – Reference to nomenclature – Specification of name	One SPINE data field in a set of ISO/TS 14048 data fields In SPINE the nomenclature and the name and can be specified in Notes in Substance.
Quantity QuantityMin QuantityMax StandardDev	Amount - Name - Parameter - Name - Value	Broader interpretation The handling of amounts is more flexible in ISO/TS 14048 compared to SPINE, and allows different amounts to be documented (see separate description of handling of amounts below)
Unit	Amount – Unit - Symbol or name - Explanation	Same interpretation

SPINE data documentation format - data fields	ISO/TS 14048 data documentation format - data fields	Comment
Origin or destination of flow – environmental type or media (ImpactMedia - Environment)	Receiving environment	Same interpretation, when the ImpactMedia is specified as Air, Water, Ground or Technosphere.
	Receiving environment specification	When a more detailed specification of the ImpactMedia has been done, e.g. "urban air", "forestral ground", etc. the detailed specification is supplied in Receiving environment specification
Origin or destination of flow – geographical (ImpactRegion – Geography)	Geographical location	Same interpretation
Description of methods used to acquire the numerical data (QMetaData)	*Process - Inputs and outputs - Documentation*	The information in QMetaData corresponds to Process – Inputs and outputs - Documentation
General for the entire data set Specific for individual flows	*Valid for all inputs and outputs Valid for specific input or output*	*Note: In ISO/TS 14048 there is a possibility to select a set of inputs and outputs to document*
Time period during which the data was acquired (Date Conceived)	Collection date	Same interpretation
Type of method (Data Type)	Data collection	Same interpretation
Description of Method (Method)	Data treatment	Same interpretation and Set of SPINE fields specified by one ISO/TS 14048 field (see SPINE data fields Represents and Notes)
Represents	Data treatment	Set of SPINE fields specified by one ISO/TS 14048 field (see SPINE data fields Method and Notes)
References (LiteratureRef)	Reference to data source	Same interpretation
Notes	Data treatment	Set of SPINE fields specified by one ISO/TS 14048 field (see SPINE data fields Method and Represents)
Recommendations for the use of the model and the data (Inventory)	*Modelling and validation*	
Applicability	Other information	Set of SPINE fields specified by one ISO/TS 14048 field (see also SPINE data fields About Data and Notes)
About Data (Data)	*Manual mapping:* - Data quality statement - Other information	One SPINE field specified by set of ISO/TS 14048 data fields Some of the information that is supplied in *Data* corresponds to *Data quality statement*. The interpretation of the fields are not however identical.
	Electronic mapping: Other information	Set of SPINE fields specified by one ISO/TS 14048 field. In electronic mapping all information in *Data* is documented in *Other information*
Notes	Other information	Set of SPINE fields specified by one ISO/TS 14048 field (see also SPINE data fields About Data and Applicability)

SPINE data documentation format - data fields	ISO/TS 14048 data documentation format - data fields	Comment
Administrative and general information (Inventory)	**Administrative information**	The information in ISO/TS 14048 Administrative information corresponds to information in SPINE Inventory
DateCompleted	Date completed	Same interpretation
Publication	Modelling and validation – Information sources	Broader definition in ISO/TS 14048 *Note:* In ISO/TS 14048 a number of information sources that have been used in the documentation may be supplied.
	Data documentor	*Note:* Data documentor in ISO/TS 14048 do not directly correspond to a SPINE concept, but the information is often documented in Publication in SPINE.
Availability	Access restrictions	Same interpretation
Copyright	Copyright	Same interpretation

Handling of amounts in ISO/TS 14048

The handling of amounts is more flexible in ISO/TS 14048 compared to SPINE. In ISO/TS 14048 different types of amounts may be specified more specifically, whereas in SPINE only a quantity, minimum value, maximum value and a standard deviation may be documented. Thus in SPINE the values can be documented by a Quantity, a QuantityMin, a QuantityMax, and a StandardDev. In ISO/TS 14048 the values are documented by the following data fields:

Amount
- Name: the name of the distribution function
- Parameter
  - Name: the name of the parameter
  - Value: the value of the parameter

When switching from SPINE to ISO/TS 14048 the SPINE data fields Quantity, QuantityMin, QuantityMax, and StandardDev is documented as the following:

Amount
- Name: SPINE95 Quantity
- Parameter
  - Name: Quantity
  - Value: the Quantity value
  - Name: QuantityMin
  - Value: the QuantityMin value
  - Name: QuantityMax
  - Value: the QuantityMaz value
  - Name: StandardDev
  - Value: the StandardDev value

Documentation of a model of a technical system that consists of a combination of models of technical systems

Both the SPINE and the ISO/TS 14048 allows transparent documentation of models of technical systems that consists of a combination of models of technical systems. In such documentation the included models are documented individually, together with a documentation of the composite system. The handling of such documentation is structured and interpreted in the same manner in both formats. For details on how this is mapped between the two formats, please see CPM report 2003:8.

Additional or more detailed information in ISO/TS 14048 compared to SPINE

There are a number of data fields in ISO/TS 14048 that do not directly correspond to a SPINE field or that is more detailed. Table 1 provides a list of these data fields, together with a description of where the information is documented when a ISO/TS 14048 formatted process is imported into the SPINE data format. For details on how to interpret the ISO/TS 14048 data fields, please see appendix 1.

Table 2. Additional or more detailed information in ISO/TS 14048 compared to SPINE

ISO/TS 14048 data field	Documented in SPINE data field
Process – Process description	
Technology - Technology picture	ObjectOfStudy -Function as a url to picture file in e.g. a local file system.
Operating conditions	ObjectOfStudy - Function
Mathematical model	ObjectOfStudy - Function
Valid geography – GIS reference	Inventory - GeographyBoundary

Data acquisition
   - Sampling procedure
   - Sampling sites
   - Number of sites
   - Sample volume
      - Absolute
      - Relative
	General QMetaData – Method

Process – Inputs and outputs	
Environment condition	Inventory - NatureBoundary

Related external system
   - Origin or destination
   - Transport type
   - Information reference
	Specific QMetaData - Notes

Internal location	Specific QMetaData - Notes
Modeling and validation	

Modelling principles
   - Data selection principle
   - Adaptation principles
	Inventory – About Data (Data)

Modelling principles
   - Modelling constants
      -Name
      - Value
	ObjectOfStudy - Function

Validation
   - Method
   - Procedure
   - Result
	Inventory – About Data (Data)

References

[1] Carlson R., Erlandsson M., Flemström K., Pålsson A-C., Tidstrand U., Tivander J. "Data format mapping between SPINE and ISO/TS 14048", CPM-report 2003:8

[2] ISO/TS 14048: 2002 (E) Environmental management – Life Cycle assessment – Data documentation format

[3] Arvidsson P. (Editor) et al; "Krav på datakvalitet CPM:s databas 1997"; CPM-report 1997:1 (in Swedish)

[4] Pålsson A-C., Introduction and guide to LCA data documentation using the CPM documentation criteria and SPINE format, CPM report 1999:1

[5] Arvidsson P., Carlson R., Pålsson A-C."An interpretation of the CPM use of SPINE in terms of the ISO 14041 standard" CPM report 1999:9

[6] Flemström K, Pålsson A-C. "Introduction and guide to LCA data documentation using the CPM documentation criteria and the ISO/TS 14048 data documentation format", CPM-report 2003:3

[7] Flemström K, Pålsson A-C. "An interpretation of the CPM data quality requirements in terms of ISO/TS 14048 data documentation format", CPM-report 2003:4

Appendix 1. Short guide for LCI data documentation according to ISO/TS 14048 format and the CPM data documentation criteria

The following short guide is an excerpt from CPM-report 2003:3 Flemström K., Pålsson A-C., "Introduction and guide to LCA data documentation using the CPM documentation criteria and the ISO/TS 14048 data documentation format". For further information or a more detailed guide please refer to this report.

Process

Process description

Description of model of technical system

Name
Descriptive and most commonly known name of the process. The name should give a first indication of which technical system that is described.

Class
Categorisation of the process, for example according to sector. The class is described by:
- *Name:* The appropriate name in the class that specifies the process according to a class-nomenclature. See appendix 1.
- *Reference to nomenclature:* Specification of the class-nomenclature from which the Name is chosen.

Quantitative reference
Specification of the quantitative reference for the process. A quantitative reference is the reference to which the amounts of the inputs and outputs are related, e.g. the functional unit or reference flow. The quantitative reference is described by:
- *Type:* The type of quantitative reference, e.g. functional unit, reference flow, etc. The type is chosen from a nomenclature, see appendix 1.
- *Name:* The name of the quantitative reference
- *Amount:* The amount of the quantitative reference
- *Unit:* The unit of the quantitative reference

Technical scope
A short description of the scope of the process. The scope may range from an individual process, to more composite systems such as a cradle to gate system for a specific product. The specification is done by a nomenclature, see appendix 1.

Technology
Short technology descriptor
Short description of the included technology. This may be used as an abstract that supplements the detailed description in *Technical content and functionality*.

Technical content and functionality

Detailed description of the model of the technical system, with regard to included process steps and activities, etc. The description should provide an understanding on how reported inputs are transformed into the reported outputs.

Technology picture

Graphic representation of the technology e.g. a graphical flowchart of the process. The purpose of the picture is to illustrate the technical system and supplement the description of technology in *Technical content and functionality.*

Process contents

Process contents is used only for processes that consists of a combination of individually documented processes. The process contents is described in terms of:

- *Included processes:* References to the documentation each process that is included.
- *Intermediate product flows:* References to the inputs and outputs that link the included processes together. The referencing is done two by two by for each link by specifying the source and the destination process and the inputs or outputs in the two processes that are linked together. This is documented by:
  - *Source process:* Reference to the process that is the source of the input or output.
  - *Input and output source:* Reference to the specific input or output in the source process.
  - *Input and output destination:* Reference to the specific input and output in the destination process that is linked together with the input or output source.
  - *Destination process:* Reference to the process which is the destination of the input or output

Valid time span

Description of the time span during which the documented process and data may be valid. The range of the valid time span for the process and the data may be described through:

- *Start date:* The start date of the valid time span, specified as XXYY-MM-DD
- *End date:* The end date of the valid time span, specified as XXYY-MM-DD
- *Time-span description:* A description of the valid time span.

Valid geography

Description of the geographical area or location for which the documented process is valid. The valid geography is described through:

- *Area name:* One or several name of the area or location, specified by a nomenclature.

- *Area description:* Description of the area or location, for example through the geographical extension or geographical limitations of the studied process or system
- *Sites:* Address or addresses to the included production sites.
- *GIS (Geographical Information System):* One or several references to the location or area in a GIS system.

Additional information or specification not included in the CPM data documentation criteria

Aggregation type

The type of aggregation that has been performed on the process, specified by a nomenclature (see appendix 1)

Technology

Operating conditions

Description of different relevant operating conditions for the process, that may have an influence on entire sets of measurements or individual measurements. For example, operating conditions can be relations between inputs and outputs.

Mathematical model

Mathematical model can be used for a mathematically formal description of the underlying physical relationships between the inputs and outputs of the process. The mathematical model is documented by:

- *Formulae:* One or several mathematical formulae that is used in the model. The formulae are specified in accordance with mathematical syntax.
- *Name of variable:* One or several names of defined variables that is used in the formulae.
- *Value of variable:* Values of the defined variables.

Data acquisition

Data acquisition is used to describe the data collection and treatment at the process level. The data acquisition is documented by:

- *Sampling procedure:* Description of the procedure that has been used for selecting the included processes from the available population for which the process is valid.
- *Sampling sites:* Address(es) to the site(s) that have been included.
- *Number of sites:* The number of included sites.
- *Sample volume*
  - *Absolute:* The total production volume for the included sites.
  - *Relative:* The relative share of the production volume for the included sites in relation to the total production volume of the population for which the process is valid.

Inputs and outputs

Data for input and output flows

Identification number

Specific number identifying the input or output.

Direction

The direction of the input or output, i.e. input to or output from the process. There is an exclusive nomenclature that shall be used according to ISO/TS 14048: Inputs, Outputs and Non-flow related aspects.

Group

The group to which the input or output belongs, specified by a nomenclature (see appendix 1).

Receiving environment

The receiving environment for the input or output. This information is important to be able to perform impact assessment in an LCA study. The receiving environment is specified by a nomenclature (see appendix 1).

Receiving environment specification

Further detailed specification of the receiving environment. This supplements the specification in *receiving environment*, and allows for more specific impact assessment. The information is specified by a nomenclature (see appendix 1).

Geographical location

Specification of the geographical location where the process and the inputs and outputs occur, by a nomenclature (see appendix 1).

Name

Name text
The name of the substance entering or leaving the process. It is recommended to name the substance in accordance with a specified nomenclature, and specify the nomenclature that is used in Reference to nomenclature.

Reference to nomenclature
A reference to the nomenclature from which the name of the substance is chosen e.g. CAS-numbers, CPM-report 2001:2.

Specification of name
Further specification of the name, to further facilitate the interpretation of the name of the substance.

Amount

The amount of the input or output, in relation to the quantitative reference e.g. the functional unit.

Name
Name of the distribution function that is used to describe the amount.

Parameter
One or several parameters for the amount, where the actual value are specified. The set of parameters are specified by the distribution function.

Each parameter is expressed in terms of a *Name* and a *Value*
- *Name*   The name of the parameter, e.g. Quantity, QuantityMin, QuantityMax. See appendix 1 for a nomenclature.
- *Value*   The value of the parameter. Please note that the unit for the parameters are supplied in *Unit* (below).

Unit
The unit for the amount, documented by:
- *Symbol or name* The unit or symbol for the given amount. SI-units are recommended.
- *Explanation* Explanation and/or reference of the symbol or name. When SI-units are not used, it is important that the unit or symbol is explained, in order for it to be correctly interpreted.

Property
Information about properties of the inputs and outputs, such as density, temperature, pressure and price. Properties are documented by:
- *Name:*   The name of the property, e.g. density, temperature, etc.
- *Amount:*   The amount of the property, for the specific input or output.
- *Unit:*   The unit for the amount.

Description of methods used to acquire numerical data
Documentation of the methods that have been used for data collection and data treatment. The documentation may be given for a specific individual input or output and/or for a set of inputs and outputs. This is useful when the same methods and assumptions have been used to collect data for more than one input or output.

Data collection
A short specification or indication of the methods that have been used to collect the data. The specification may be done through a nomenclature (see appendix 1).

Collection date
The date or the time period during which the data and the basis for the data were collected.
The following data format should be used: CCYYMMDD/CCYYMMDD.
If only the year is known, write: CCYY0101
If only the year and month is known, write: CCYYMM01.

Data treatment
Description of the methods, sources and assumptions used to generate the amounts that are presented for inputs and outputs. The description should include a clear account of the methods that have been used and the assumptions and calculations that have been performed to obtain the numerical values that are presented.

Reference to data source
References to data sources that have been used in the data collection and data processing, and that is referred to in Data treatment.

Additional information or specification not included in the CPM data documentation criteria

In addition to the information about inputs and outputs according to the CPM data documentation criteria, the following information may be given for individual inputs or outputs in ISO/TS 14048.

Environment condition

Qualitative description of the conditions of the environment to facilitate impact assessment. The environment conditions supplements the indication of the environment that is supplied in *Receiving environment* and *Receiving environmental specification*. This detailed description allows for more specific and local impact assessment to be made.

Internal location

Information about how an input is used within the process or from where an output originates within the process.

Related external system

Information of related external technical systems of an input or output, to e.g. identify upstream and downstream processes not included in the described process.

The related external systems can be described by:
- *Origin or destination:* The delivering or receiving processes for intermediate product flows e.g. geographical information about the destination for an output.
- *Transport type:* Name of the transport supplier or the transportation mode
- *Information reference:* References to contact persons and relevant documents where information on the described related external systems may be found

Modelling and validation

Modelling and validation describes the prerequisites for the modelling of a process as well as the validation of the resulting model and recommendations and a data quality statement.

Description of choices made during the modelling of the process and the objective for the choices

Intended application

Description of the intended application for the process regarding e.g. geographical, technology or other trade specific applicability. The intended application for the process generally determines the level of detail and quality ambition that is used in the modelling. Thus, the description is important for users to understand the documented process as a whole.

The intended application is generally documented through a description of the purpose or objective for the modelling, data collection and documentation of the process.

Information sources

Specification on the information sources that have been used in the modelling of the process, e.g. different technical handbooks, personal contacts at production sites, etc. If the complete process is documented and published in a different format, this reference should especially be given, for example if a literature reference has been used as the only source in the documentation of the process. An unlimited number of information sources e.g. literature, personal communication, databases etc can be given.

Modelling choices

Criteria for excluding elementary flows

Description of the criteria that have been used when choosing which elementary flows to include or exclude. Elementary flows are defined as input or output flows to a process that originates in or ends up in the environmental system, such as a natural resource extracted from the ground or an emission let out in water or air. The description of the criteria should both include a specification of the criteria and a description of the motive for the choice.

Criteria for excluding intermediate product flows

Description of the criteria that have been used in the selection of intermediate product flows i.e. inputs or outputs that comes from or leaves to another technical system. The reasons why a certain input or output have been excluded should also be described e.g. if data is missing.

Criteria for externalising processes

Description of the criteria that has been used to exclude technical subsystems. The description can be made through a specification of which subsystems that have been excluded, together with a description of the reasons why the subsystems have been excluded, e.g. due to lack of data.

Allocations performed

Description of allocations that have been performed in modelling of the process to obtain the numerical data that are documented. Allocations is documented by:

- *Allocated co-products:* The co-products that have been removed through the allocation
- *Allocation explanation:* Description of the allocation, including choice and justification of allocation method, procedure and information that have been used in the allocation.

Process expansion

Description of process expansions performed, with regard to which processes that have been included together with an explanation for the expansion. Process expansions are described by:

- *Process included in expansion:* Specification of the processes that have been included as a result of the process expansion

- *Process expansion explanation:* Description of the reason, motives and details for the system expansion.

The subsystems included as a result of the system expansion are also described the process description, e.g. in Technology and Process contents.

Recommendations for the use of process and the data

Data quality statement

Description of known quality strengths and weaknesses in the documented process and data. The description can e.g. be made through a general description of the quality of the numerical basis for the data, or quality deficiencies in the overall documentation of a process, regarding how representative the process data is.

A quality analysis made by the data generator of how uniform the study methodology is applied to the various components of the study, is considered.

Validation

Detailed description of any validation that has been performed on the documented process. Validation is documented by:
- *Method:* Short description of the type of method that have been applied in the validation.
- o *Procedure:* Description of the aspect of data quality that have been examined.
- *Result:* Description of the result from the validation. If errors, missing data or other deficiencies were found during the validation but no corrections have been made, this should be especially documented.
- *Validator:* The person performing the validation. The name, competence, organisation and address of this person should be given.

Other information

Other relevant information about the process and the data that is not included in other data documentation. For example information about how to use the process, known limitations and assumed area of application of the described process regarding e.g. geographical, technology or other trade specific applicability. Also, other general cautions and recommendations may be given regarding how the process and the data can be used.

Additional information or specification not included in the CPM data documentation criteria

In addition to the documentation of modelling and validation according to the CPM data documentation criteria, ISO/TS 14048 also allows documentation about the *modelling principles*.

Modelling principles

Modelling principles include general principles that have been used in the modelling of the process. Modelling principles is documented by:
- *Data selection principle:* The principle that have been used when selecting which data to include in the process.

- *Adaptation principles:* The principles that have been used to remodel the collected data into a unit process suited for LCI.
- *Modelling constants:* The assumptions that have been held constant throughout the modelling of the process. One or several modelling constants may be documented. The modelling constants are described through:
  - *Name:* The name of the modelling constant
  - *Value:* The value of the modelling constant

Administrative information

Identification number

A unique identification number for the process, that is specified by the registration authority. The identification number is used to identify the process.

Registration authority

The organisation responsible for the documented process. For example, for data sets published in CPM's LCI database CPM is the registration authority.

Version number

Version number for the documented process. The version number can be used to find the latest version of the documentation of a process.

Data commissioner

The person(s) or organisation responsible for the commission of the data collection or updating of the data. The data commissioner is specified by name, mailing address, phone number, fax number and email address.

Data generator

The person(s) or organisation responsible for the modelling of the process, including interpretation, compilation or updating of the data. The data generator is specified by name, mailing address, phone number, fax number and email address.

Data documentor

The person responsible for the documentation of the data in the ISO/TS 14048 data documentation format. The data documentor is specified by name, mailing address, phone number, fax number and email address.

Data completed

The date when the study or data for the process were completed and reported. The date should be specified as YYYY-MM-DD

Publication

Reference to a literature where the original copy of the documentation of the process can be found.

Note: The literature reference on which the data documentation is based is specified in *Information sources* (see modelling and validation), if the complete process has been published elsewhere in a different format.

Copyright

The holder of copyright for the documented process.

Access restrictions

Short description of how the document may be distributed in terms of conditions and agreements e.g. details on secrecy agreements or restrictions regarding the data.