A new open source LCA software

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EcoBalance Conference

Tsukuba, 14-16 November 2006

GreenDeLTa TC

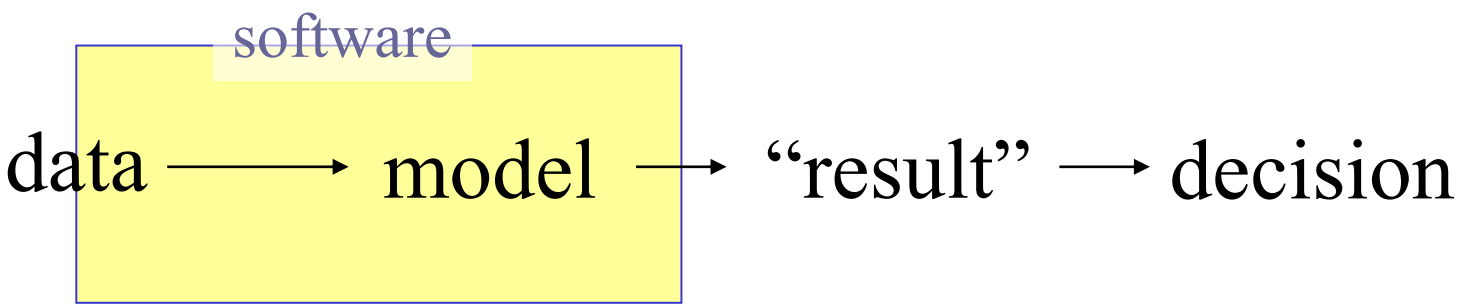
SOUND LIFE CYCLE ANALYSES

Outline

1. Introduction: Circumstances & motivation
2. Towards a new open source software for sustainability assessment
3. An example: The format converter module
4. Outlook

1. Open Source sustainability assessment software: Circumstances and motivation

The role of software in sust. assessment



The role of software in sust. assessment, c'td.

- Software fundamental for decision support;
- Software has influence on
  - What models can be built;
  - How models can be built;
  - Which methods can be applied (for calculation; impact assessment; data quality assessment; uncertainty assessment; interpretation; …);
  - Which results are easily and not so easily accessible;
  - And how results are presented.

The role of software in sustainability assessment, c'td.

→ Decision support depends on software; decisions and interpretation, in turn, are key elements in consulting and science ■

Open Source Software

- Richard Stallman, Free Software Foundation:
  Free information flow

- Meanwhile, a multitude
  of different
  "Open Source" Licences
  (GNU; Apache; MySQL; …)

- Differences:
  Access to source code;
  use in "business environments" (selling software; using software in paid projects; …)

Open Source Projects

Flagships

- Firefox
- Linux
- MySQL
- …

Small projects

- awf-cms

(e.g. at sourceforge.net:
Registered Projects: **134,082**
Registered Users: **1,433,849**)

Open Source Projects for sustainability assessments?

- Various attempts in the past, e.g. Le Téno 1999
- Several tools available as freeware, single-person projects / limited features.
- earthster, Norris et al.

Challenges and Opportunities

C:

- Software integration, code from multiple sources, not all known personally?
- Balance between business and provision of a "public good"

O:

- High-quality software
- Support from community and from Open Source projects → less effort if well managed
- For users, MANY advantages (independence; broader community; reliability; transparency; low LCC costs!; maintenance and support competition; …)

2. A new open source software for sustainability assessment

3 Key ideas

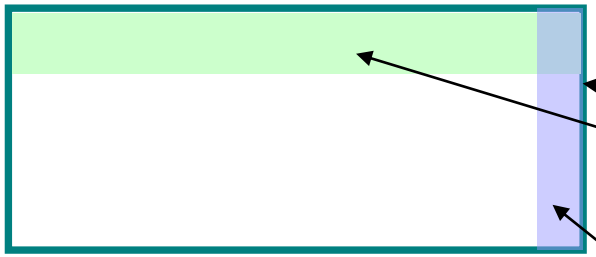
1. Design and build a fast, reliable, high-performance, modular framework for sustainability assessment & life cycle modelling, that allows visually attractive and flexible modelling, for sophisticated and simple models, in a “standard” language, using only widely available Open Source software

2. Create a contributing programming community

3. Build modules for the framework, and enable users to build their own modules.

IT background

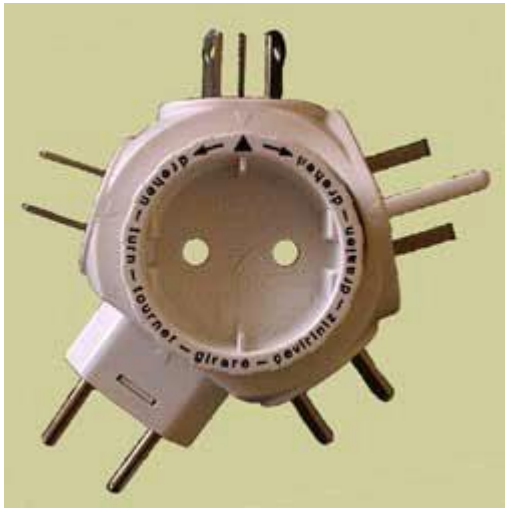
- Eclipse Java framework
  (formerly IBM, now Open Source)
- Java Universal Network/Graph Framework
- MySQL database



In specification:
Framework
Module 1 “uncertainty calculation and assessment”
Module 2 “format converter”

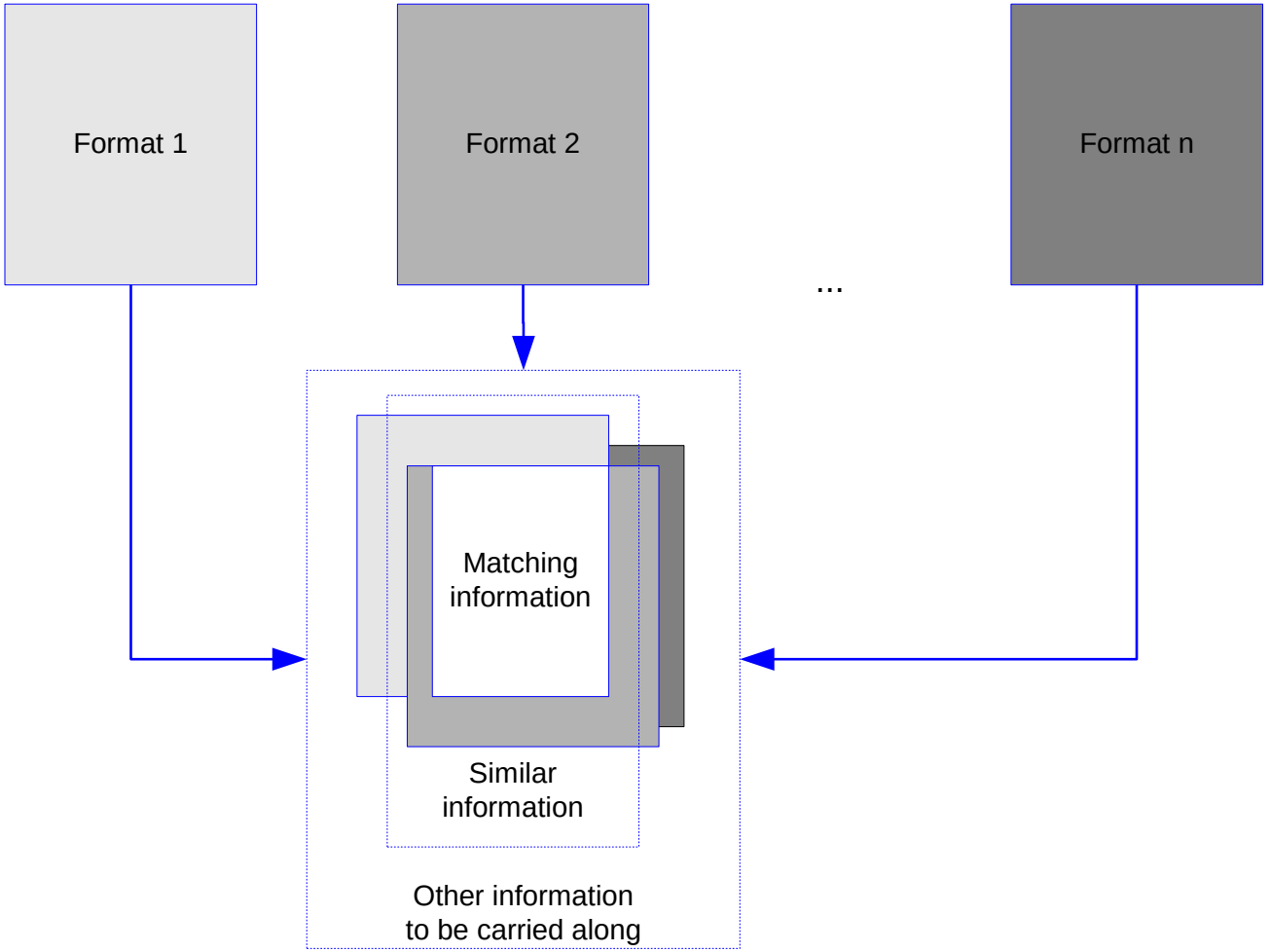
3. An example:
The format converter module

The format converter module

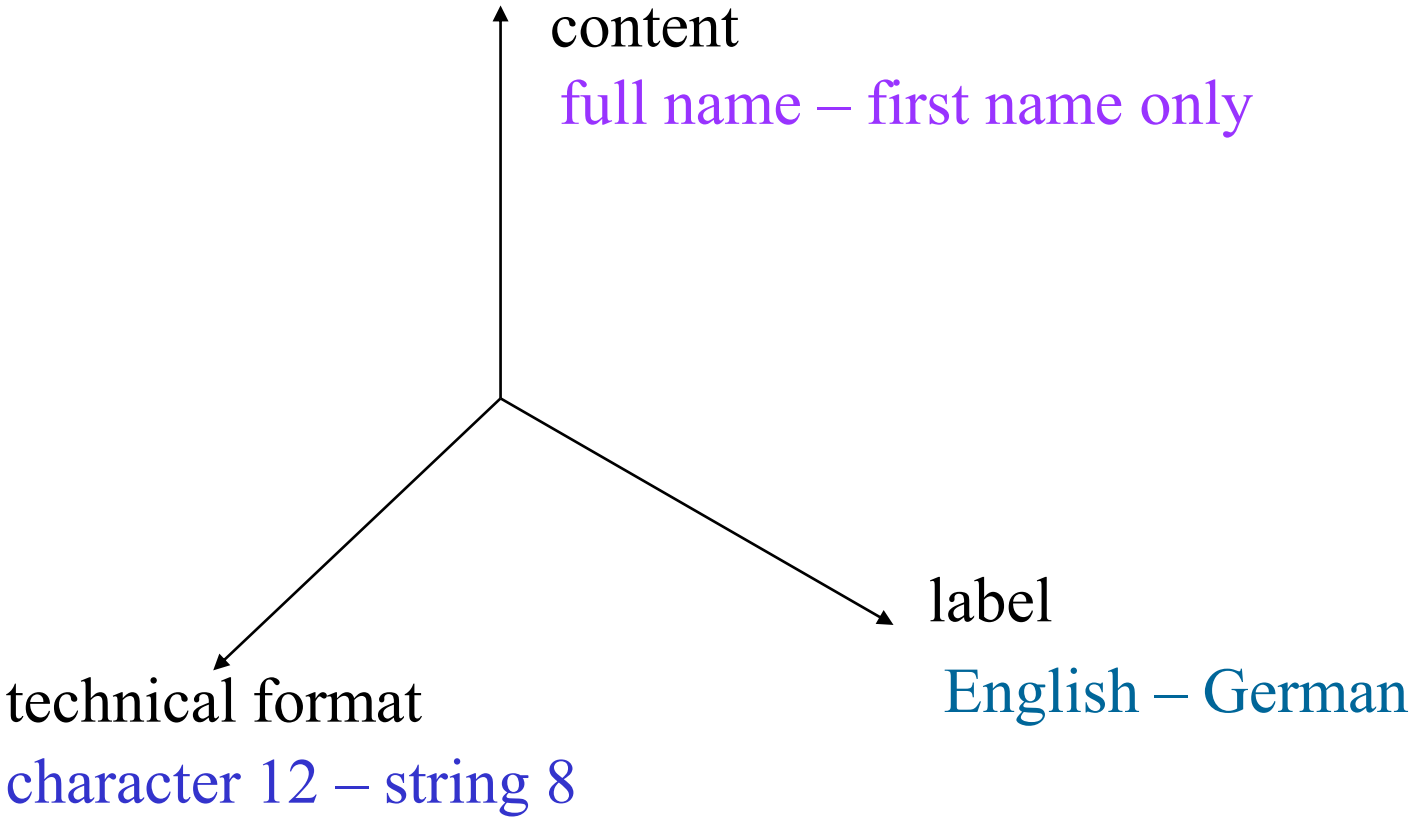


Goal: Provide a reliable, loss-less converter between important LCI data formats:
EcoSpold, ELCD, ISO@Spine, GaBi
(extend later for LCIA and meta data, other data formats)

Basic idea


Format 1
Format 2
...
Format n
Matching information
Similar information
Other information to be carried along

Three dimensions for “matching information”



A meta list of data format attributes…

			ID	Format	FormatID	field name	data ty
General information			1				
		Identification number	1.1				
		Reference to process data set	1.2				
		Impact assessment result	1.3	EcoSpold	208	impactAssessmentResult	Yes/No
Process description			2				
	Data set information		2.1				
		Identification number	2.1.1				
		Name of process	2.1.2	EcoSpold	401	name	Text80
		Specifying process information (treatment, standards, routes)	2.1.3				
		Specifying process information (mix type and location)	2.1.4				
		Specifying process information (functional unit, flow properties)	2.1.5				
		Synonyms of process name	2.1.6	EcoSpold	491	synonym	Text80
		Top-category of process	2.1.7	EcoSpold	495	category	Text40
		Sub-category 1 of process	2.1.8	EcoSpold	496	subCategory	Text40
		Sub-category 2 of process	2.1.9				
		Statistical classification code of process	2.1.10	EcoSpold	501	statisticalClassification	Numbe
		Acronym of statistical classification	2.1.11				
		Short description of statistical classification	2.1.12				
		Reference to source of statistical classification	2.1.13				
		General comment - Data quality statement	2.1.14	EcoSpold	492	generalComment	Text32
		Reference to external documentation / files source	2.1.15				
		Reference to external documentation / files sub-source	2.1.16				
		Dataset relates to product	2.1.17	EcoSpold	400	datasetRelatesToProduct	Yes/No
		Local Name	2.1.18	EcoSpold	490	localName	Text80
		Infrastructure process	2.1.19	EcoSpold	493	infrastructureProcess	Yes/No
		Local category	2.1.20	EcoSpold	497	localCategory	Text41
		Local sub-category	2.1.21	EcoSpold	499	localSubCategory	Text41
		infrastructureIncluded	2.1.22	EcoSpold	494	infrastructureIncluded	Yes/No
		Energy values	2.1.23				

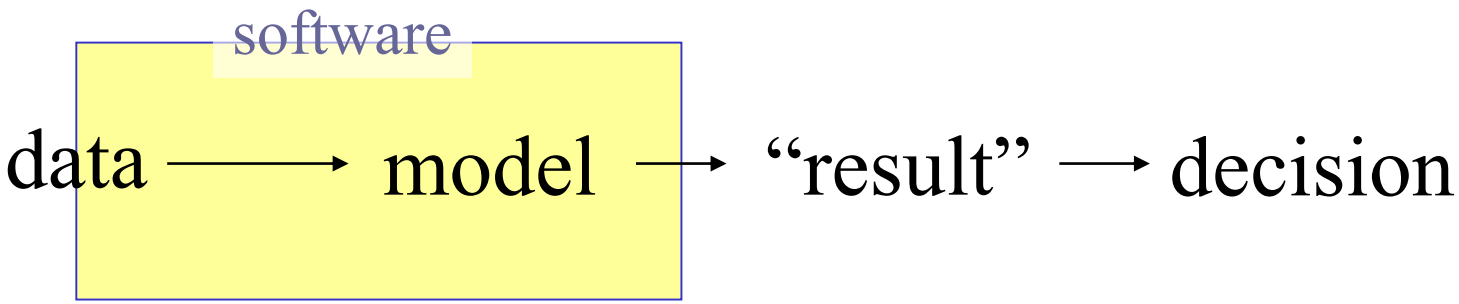
…can be converted into an XML file that is used as main data exchange platform

```
- <mappingRules>
  - <processDescription>
    - <DataSetInformation>
      - <datafield metaID="2.1.2" metaName="Name of process">
        - <dataformat name="EcoSpold" type="XmlDocument">
            <min>1</min>
            <max>1</max>
            <datatype>string</datatype>
            <size>80</size>
          - <xPathQuery>
              /ecoSpold/dataset/metaInformation/processInformation/referenceFunction/@name
            </xPathQuery>
          </dataformat>
        </datafield>
      </DataSetInformation>
    </processDescription>
  </mappingRules>
```

Advantages of the new format converter for users

- Fluent, “seamless” conversion of data from one LCI format to another
- User may change converter if necessary (e.g. default values)
- No data losses when converting back in the original format

Open Source Software and science



- Transparency,
- Not one standardised method in science,
- Openness of open source software)

4. Conclusion & Outlook

Conclusions

- → Aim of Open Source Project (2006-2008): Develop high-performance, modular framework for sustainability assessment & life cycle modelling
- → Using Open Source, standard components for language, components, database
- → Two modules, uncertainty assessment and format converter, will be implemented in project course

Conclusions, 2

→ Format converter will allow loss-less transformation of important LCI data format, UML-based

→ Highly modular framework will enable inclusion of many other components (impact assessment modules; … ANY aspect of sustainability assessment!)

→ Organisation: Project core | Funding consortium | contributing institutions & individuals | evaluating community | users

Thank you!

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