Sustainability Reporting Topic Maps:
An Approach to Support Stakeholder Inclusiveness

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Abstract

This article propose a method of how to produce and conceive an Internet-based sustainability report. After the Global Reporting Initiative (GRI) created the inalterable representation of the third output of GRI-guidelines companies begin to create sustainability reports and publish it via the world wide web. But thinking about that these reports are divided into different environmental messages a typical interested person will be confronted with too much information. Typically this results in an unperceptive view of all environmental task which are related to each other.
Using the eXtensible Business Reporting Language (XBRL) we suggest a method of how to alter sustainability reports into Topic Maps (XTM).

1. Introduction

Sustainability reports should provide a balanced and reasonable representation of the sustainability performance of a reporting organisation. "Sustainability reporting is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organisational performance towards the goal of sustainable development."(GRI 2006, 3) The Global Reporting Initiative (GRI) defines in their 3rd Generation of Sustainability Reporting Guidelines (G3) stakeholder inclusiveness as follows: "The reporting organisation should identify its stakeholders and explain in the report how it has responded to their reasonable expectations and interests." (GRI 2006, 10)

The reasonable expectations and interests of stakeholders are a key reference point for many decisions in the preparation of a report, such as the scope, boundary, application of indicators, and assurance approach. However, stakeholder engagement in the sustainability reporting process is different, a flexible approach is needed. Thus, with the usage of the Sustainability Reporting Taxonomies Architecture (SRTA) (Arndt et al. 2006), we propose a solution of how to transform sustainability reports into Topic Maps (XTM).

2. Sustainability Reporting Taxonomies Architecture (SRTA)

The Sustainability Reporting Taxonomies Architecture (SRTA) describes an architecture of sustainability reporting taxonomies using the eXtensible Business Reporting Language (XBRL). This architecture establishes rules and conventions that assist in comprehension, usage and performance among different taxonomies of sustainability reporting (e.g. financial, environmental, and social taxonomies).
The SRTA assumes use of the XBRL 2.1 Specification. XBRL, XML Schema (W3C 2004), and XML Linking Language (W3C 2001) are implicitly a part of this architecture. Based on the Financial Reporting Taxonomy Architecture (FRTA) SRTA addresses several areas of consistency (FRTA 2005):

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- *Representation*: Taxonomies should use similar XBRL structures to represent similar relationships among concepts.
- *Modularity*: Taxonomies should have a common approach to grouping taxonomy content at a file level.
- *Evolution*: Taxonomies built to the SRTA can be extended or revised using similar approaches.

The XBRL is a worldwide accepted standard, developed and forced by the biggest professional group of Certified Public Accountants (CPA) in the United States of America, the American Institute of Certified Public Accountants (AICPA). Usually business information will be kept in various ways in companies. For example there will be no difference between the collected information in a main office of a company and its sister companies. But one reason why it is so difficult to transfer business information from one place to another are the different possible ways of how these information can be stored and in which purity. Using the basics of the worldwide accepted standard eXtensible Markup Language (XML) the markup language XBRL gives investors, financial institutions, or other involved organisations the option to transfer business information for all needed possibilities. Additionally while using a valid XML format companies have the chance to use free interfaces to transfer these information easily via the web or check these formats for information. Compared to other business XML formats (e.g. Research Information Exchange Markup Language (RIXML), Markup Language for the Financial Information eXchange (FIX), Application Message Layer (FIXML), Market Data Definition Language (MDDL), or Open Financial Exchange (OFX)) XBRL prevailed as the most recent standard in accounting global acting companies. In addition XBRL stands for a standard which will be used on most continents in the world, like North-America, Australia, Europe, and Asia.

XBRL determines structures, e.g. for annual reports, and specifies a number of reports on the one side and its individual contents on the other side (XBRL 2006a). Both approaches are split into instances and taxonomies (XBRL 2006b). An instance record defines xlinks (eXtended links, W3C Xlink 2001) which are related to taxonomy records which consists of W3C XML Schema modelling descriptions. Normally this file contains the following content:

- *Labels*: Beside of using different multilingual descriptions a label gives the element in an instance a name.
- *References*: While using a linkbase references make it possible for users to add information to or delete information from a label. For instance a label which contains information about a law can be explained better if a linkbase to an external description of this law exists.
- *Definition*: Definition linkbases make it possible to bring variant labels into a ranked order. For example typical XML father-child, or child-father hierarchies can be created. E.g. this linkbase gives you the option to split an accounting "sum" into "sub-instances" and "subtotals".
- *Presentation*: This linkbase follows the concept to make a better granular order available for child elements. The presentation linkbase can be described as an extension of the definition linkbase which makes brother-sister relationships available.
- *Calculation*: For XBRL the calculation linkbase can be described as the kernel of all linkbases. It contains information about relationships between elements and its corresponding operators, e.g. plus, minus, division or multiply. Additional Binstock (2005) mentions that this linkbase makes it possible to create semantic relations in XBRL files.

Sustainability reporting encompasses three different types of disclosures (GRI 2006, 19):

- *Strategy and Profile*: Disclosures that set the overall context for understanding organisational performance such as its strategy, profile, and governance.

- *Management Approach*: Disclosures that cover how an organisation addresses a given set of topics in order to provide context for understanding performance in a specific area.
- *Performance Indicators*: Indicators that elicit comparable information on the economic, environmental, and social performance of the organisation.
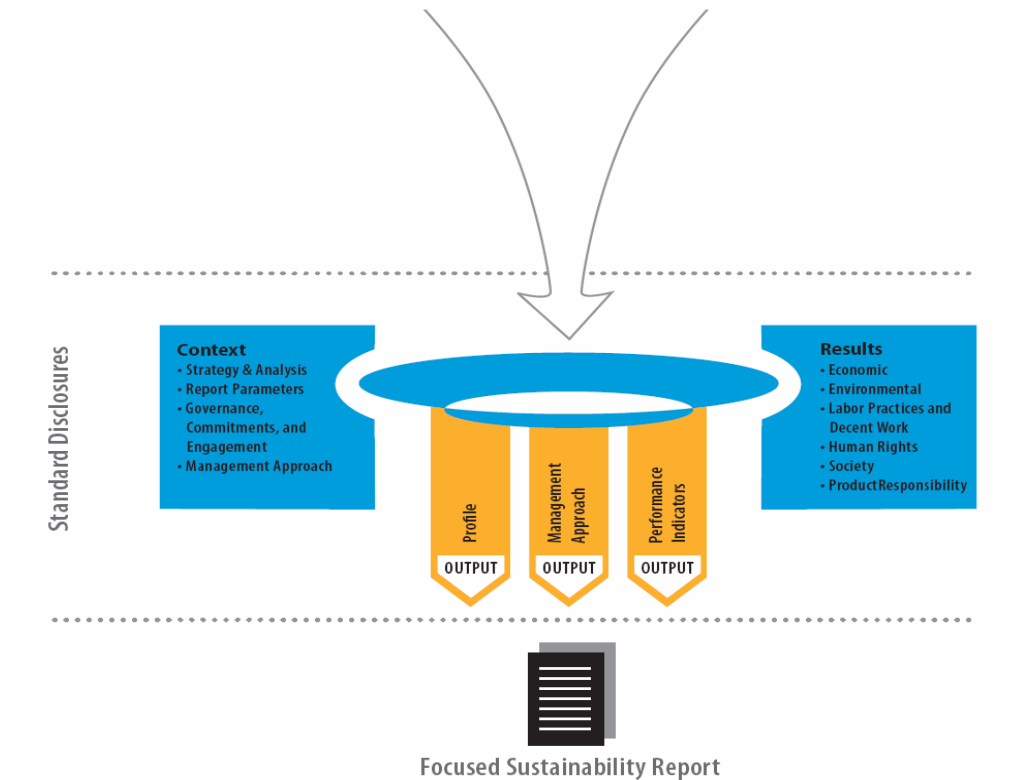

Figure 1: Overview of GRI Standard Disclosures (Source: GRI 2006, 19)

3. Sustainability Reporting Topic Maps (SRTM)

3.1 Topic Maps

Following the goal to reach a big audience companies and organisations publish their sustainability reports via their web presence while publishing via ad-hoc messages, print like newspaper, magazines and brochures or news-ticker become negligible. Usually the content of a sustainability report is arranged by its topics, e.g. environmental strategies. But this arrangement produces one disadvantage: the audience of the sustainability report is addressed to lose the overview while informing themselves about one sustainability of one topic. Typically all topics of a sustainability report can be described as a net with a cause and effect. All topics are connected to or influence each other.

The computer science offers a standard to avoid this disadvantage: the ISO/IEC 13250:2000, also known as Topic Maps (TM). These TMs published as purpose of the Davenport Group (Pepper 2000) offer you an idea of how to represent knowledge via information technology. Concentrating onto a topic and visualizing all topic relationships to other topics the audience which is interested into the sustainability report gets a better representation what is going on. Nonetheless TMs can be seen as a new way of e-learning: because digital files are used these files can easily be converted into other formats so that interested persons can interact with TMs.

All topics of a TM represent knowledge as a node where each node has a relationship to other nodes where information can be completed. In addition occurrence elements are used. These occurrences informs the viewer which other media (e.g. pictures) can be used to fulfill the information content. TMs can also be subscribed as a specification of the semantic web. Like the semantic web TMs use information technology to build up thesauri, classify topics or create indexes for quicker search.

Following the goal to make TMs more practical for the internet TMs has been uplifted in the year 2002. The standard ISO/IEC 13250: 2000 has been improved by the TopicMaps.org author group to the new standard ISO 13250: 2003 (Park, 2002). In contrast to the old standard the new one used the proofed eXtensible Markup Language (XML) and changed its file structure to an eXtensible Markup Topic Map (XTM). With this measurement user of XTMs got the possibility to merge other information sources with the current XTM so the information content could be fulfilled additionally. For example a law could be fulfilled with the full law text or different decisions of justice courts via the internet.

A big plus of the new standard is the usage of the element scope. This element can be used to represent a tailored view for different interest groups without recomputing the whole topic map. If a person is interested in special topics, e.g. in the CO_2 emission the element scope helps to represent a distinct sustainability report. The person is not confronted with a big information flood which are out of the interest of this person. But while playing with these scope elements readers still have the chance to receive all other information the topic map contains. Readers can receive information e.g. about financial measurements and all relations between the CO_2 emission and the financial acting.
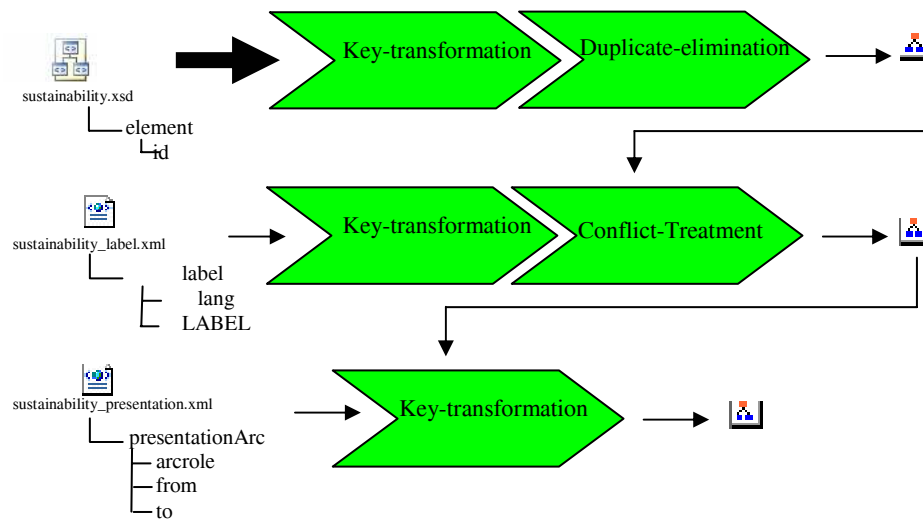

Figure 2: Creating a Sustainability Reporting Topic Map (SRTM)
(Source: Arndt et al. 2007, 54)

That's why TMs are a perfect tool to represent sustainability XBRL. Different information will be distributed to different interest groups without rewriting the whole sustainability report or losing information (Arndt/Günther, 2004). In addition these TMs can be fulfilled with information while using external sources.

The ISO/EC Topic Maps standard 13250 is a standard for describing information structures and associating them with information resources. The enabling of multiple, current views of set of information resources is one of the benefits of topic maps. The development of a topic map for sustainability reporting can help to support the stakeholder inclusiveness.

The process of how to create a Sustainability Reporting Topic Map (SRTM) can be done in three steps: the first step is the generation of a general valid XTM out of the box, while the second fulfills this XTM with information step by step using the SRTA taxonomy. Part three uses external or internal files to visualize different scopes of the created XTMs.

3.2   How to create a Sustainability Reporting Topic Map (SRTM)

As described in (XBRL 2006b) XBRL taxonomies are separated into syntactical and semantic layers. We decide to concentrate on syntactic ones. Every linkbase contains - for every element - a locator. Using the support of its arc elements the locator links to the equivalent of the schema file. This can be done individually or in pairs. For example referencing in pairs means to reference a father-child relation on the one hand and to reference the child-father relation on the other hand. The fact that all schema files contain XBRL root elements offers us a good starting point to transform XBRL into XTM. The elements attributes will be transformed to unique topic identifiers (id) in our resulting XTM. Compared to the specification of XBRL an attribute can concatenate father-child nodes. That's why we propose to use the ending part of an attribute name. As mentioned before another step is the deduplication of topics: duplicate attributes will be replaced with only one entry while concatenating all available information of the same attribute. Unnecessary information like data type will be removed from our XTMs.

3.3   The Completion of the Information and Extraction of the Base Name

Using the label linkbase and its related calculated ids as shown in chapter 3.2 legible multilingual labels can now be extracted. The locator of each element in the label link base is now related to an element in the schema file. While extracting the unique id as described before we are able to add describing names additionally. These names can either be shown multilingual or been used as scopes.

The usage of the definition and the presentation linkbase makes it possible to receive child-father relations. Each first appearing presentationArc will be used to build up the hierarchical XBRLTM structure. In contrast to build up brother-sister associations meta-information like "from" and "to" will be used.

3.4   Specialization of different Scopes for Stakeholder Inclusiveness

The final step of the transformation will be used to add different scopes to provide special views for special interested groups. Normally the usage of groups with the same name results into a name conflict. While all TMs have been build up using topic names, topic anchors, and the topics references were are able to add scopes to the topic characteristics (see figures 3). The scope tells the software which content should be visualized to which organisation, group, or individual interested person. Specially for large TMs scopes can be used as filter to display distinct content. Also the usage of access rights can be realized while using scopes. E.g. it does not make sense to publish the quote of how many employees will be fired at the end of the months.

This information is useful for the administrative part of an organisation and should be displayed in the scope "CEO level". But with the scope "secretary" an organisation should avoid the publication. On the other hand TM creators can use the possibility to display different labels for different user groups. E.g. it could make much more sense to use Latin descriptions for the scoped view "biologist" while using a slang description for the scoped view "normal user".

```
< association >
  < scope >
    < topicRef  xlink:href =" #insurance "/>
    < topicRef  xlink:href =" #aktionaer "/>
  </ scope >
  < member >
    < topicRef  xlink:href =" #sustainReport "> </ topicRef >
    < topicRef  xlink:href =" #ist−in−statementCEO "> </ topicRef >
  </ member >
</ association >
```

Figure 3: Adding different Members to the Scope
(Source: Arndt et al. 2007, 58)

In sum scopes of topic maps should be used for the following cases:

- Different languages and different terminology;
- Different access rights;
- Different special target groups;
- Topics (topic maps including different topics should declare the scope of the topic);
- Time: topics which are valid for only a period of time should declare their time scope.

4.   Conclusion

Actual discussion in prints like newspapers or in TV, specially about global warming or CO2 emission, gives us the evidence that organisations consciousness about environment pollution changed or should change in the near future. Specially organisations which are global industry player become a main target for this observations.

Because customers behaviour changed as they want to be environment-friendly acting persons and are interested about sustainability of products organisations started to publish their sustainability reports on their websites. Using the GRI-guidelines (GRI 2006) organisations can use a perfect tool which tells them how to structure these reports.

With this paper we followed the purpose to suggest a method of how to transform sustainability reports and make them available via web. Our purpose is a further development of a XBRL taxonomy specially used for sustainability reports (Arndt et al. 2006).

Commonly - if you look onto sustainability reporting websites - these websites are packed full with sustainability information separated from other information like financial one. Our suggested format XTM in this paper can help organisations to tackle this information flood, produce relationships between sustainability and financial information and using scopes to provide only the information which is requested. Additionally external information (e.g. paragraphs, specifications, pictures) from the web can be added to the nodes of the XBRLTM. Nonetheless companies use a format which is readable with every

software which can display ASCII code and which can easily be exchanged between different offices via web.

Bibliography

Arndt, H-K, Graubitz, H, Klesinski, R. (2007): Using Topic Maps for Sustainability Reporting. In: Marx-Gómez J, Sonnenschein M, Müller M, Welsch H, Rautenstrauch C (Eds.): Information Technologies in Environmental Engineering (3rd International ICSC Symposium, Oldenburg 2007, 29.03.-30.03.2007), Berlin/Heidelberg/New York, pp. 47-59

Arndt, H.-K., Günther, O. (2004): Environmental Reporting of Organisations – Extending the XML-based Standardization Using Topic Maps. In: Minier P, Susini A (Eds.) Sh@ring (18th International Conference Informatics for Environmental Protection, EnvioInfo CERN Geneva 2004, 21.10.-23.10.2004), Part 2. Geneva, pp. 172-183.

Arndt, H.-K.,Isenmann, R.,Brosowski, J.,Thiessen, I.,Marx-Gómez, J. (2006): Sustainability Reporting Using the eXtensible Business Reporting Language (XBRL). In: Tochtermann, K.,Scharl, A. (Eds.): Managing Environmental Knowledge (20th International Conference on Informatics for Environmental Protection, Graz 2006, 06.09.-08.09.2006), Aachen, pp. 75-82.

Binstock, C., Hoffman, C., Egmond, R.V., Walenga, W. (2005): Comparing XML and XBRL. http://www.ubmatrix.com/Documents/XBRLComparedToXML-2005-07-06%20(4).pdf, Version 06.06.2005.

eXtensible Business Reporting Language (XBRL) (2006a): XBRL FAQ. http://www.xbrl.org/Faq.htm, document dated 2006.

eXtensible Business Reporting Language (XBRL) (2006b): Extensible Business Reporting Language 2.1, Recommendation -2003-12-31 and Corrected Errata -2005-11-07. http://www.xbrl.org/Specification/XBRL-RECOMMENDATION-2003-12-31+Corrected-Errata-2005-11-07.htm.

eXtensible Business Reporting Language (XBRL) (2006c): Guidance on XBRL Instance Documents and Reports. http://www.xbrl.org/InstanceGuidance/.

Financial Reporting Taxonomies Architecture (FRTA) 1.0 (2005): Recommendation dated 2005-04-25, Corresponding to XBRL 2.1 Recommendation http://www.xbrl.org/technical/guidance/FRTA-RECOMMENDATION-2005-04-25.htm

Global Reporting Initiative (GRI) (ed.) (2006): Sustainability Reporting Guidelines, Version 3.0, 24 November 2006, Amsterdam.

International Organisation for Standardization ISO, International Electrotechnical Commission IEC (Eds.) (2202): ISO/IEC 13250 Topic Maps - Information Technology Document Description and Processing Languages (ISO/IEC 13250:2002 (2nd edition)), Geneva.

Park, J, Huntington, S. (2002): XML Topic Maps: Creating and Using Topic Maps for the Web. Amsterdam.

Pepper, S. (2000): The TAO of Topic Maps - Finding the Way in the Age of Infoglut. In: XML Europe 2000 (Ed.): Conference Proceedings, 12-16 June 2000, Le Palais des Congrès de Paris, Paris, France. GCA.

World Wide Web Consortium (W3C) (Ed.) (2001): XML Linking Language (Xlink) Version 1.0, http://www.w3.org/TR/xlink, document dated: 2001, 2007-01-30.

World Wide Web Consortium (W3C) (Ed.) (2004): XML Schema, Part 0: Primer XML Schema Part 0: Primer Second Edition. http://www.w3.org/TR/xmlschema-0/, document dated: 2004, 2007-01-30.