

Sustainability Reporting Using the eXtensible Business Reporting Language (XBRL)

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Abstract

In this paper, we propose a reference architecture for sustainability reports based on the eXtensible Business Reporting Language (XBRL) which in particular meets – among others – the forthcoming requirements of the Global Reporting Initiative's (GRI) sustainability reporting guidelines, to be released in late 2006. Currently, this third generation of GRI-guidelines (G3) has already been released as "draft-version for public comment". While developing a sustainability reporting reference architecture, we made use of an existing XBRL Financial Reporting Taxonomies Architecture (FRTA) which is widely used in financial reporting.

1. Standardisation in Sustainability Reporting

Sustainability reporting has its roots in environmental or non-financial reporting respectively. It describes a development path towards a concept of balanced reporting of an organisation, often communicating the three pillars of environmental, social, and economic performance and its mutual interrelations, what in business terms is called the triple bottom line approach, or corporate social responsibility reporting respectively. One of the most influential role in sustainability reporting is the GRI, a non-governmental international organisation launched in 1997 as a joint initiative of the Coalition for Environmentally Responsible Economics (CERES) and the United Nations Environment Programme (UNEP). The goal of GRI is to enhance quality, rigour and utility of sustainability reporting, particularly by developing globally applicable guidelines. Despite the voluntary nature applying its guidelines, the GRI is a rather catalysing player for a standardised approach in the field and hence Morhardt (2002, 32) expects that "its guideline will become the *de facto* standard for sustainability reporting worldwide". Hence, organisations "almost cannot avoid meeting the GRI standard in any case." (Morhardt (2002, 38)

Resulting from a thorough revision with a number of multi-stakeholder feedback loops and opportunities for public comments, the third generation (G3) has been released as "draft-version for public comment" (GRI 2006). The G3-Guidelines consists of three main parts: Part 1: Report content, boundary and quality (section 1.1), Part 2: Standard disclosures (section 1.2), Part 3: Guidelines use and report compilation (section 1.3).

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1.1 G3-Guidelines Part 1: Report Content, Boundary and Quality

Part 1 includes a set of eleven basic principles that should be taken into account for sustainability reporting (GRI 2006, 6). These principles are laying at the core of sustainability reporting, they are viewed as the very essentials and hence they are to be considered independently of certain report contents (GRI 2002, 18):

1. *Inclusiveness*: All stakeholders inside and outside an organisation are to be identified and be considered in the report. The organization has to focus on a reciprocal communication (feedback system).
2. *Relevance*: Relevance is the degree of importance assigned to a particular aspect, indicator, or piece of information, and represents the threshold at which information becomes significant to be reported.
3. *Materiality*: Materiality is the threshold at which an issue or indicator becomes sufficiently important so that it should be reported, and is also used to assess the relative priority of issues and indicators.
4. *Sustainability Context*: The reporting organization needs to place its performance in the larger context of environmental, social, or other limits or constraints, where such context adds significant meaning to reported information.
5. *Completeness*: All information material to report users (stakeholders) for assessing the reporters' economic, environmental, and social performance should appear in the report in a manner consistent with the declared boundaries, scope, and time period.
6. *Neutrality*: Reports have to avoid bias in selection and presentation of information and should strive for providing a balanced account of the reporter's performance.
7. *Comparability*: The reporter has to maintain consistency in boundary and scope of its reports, disclose any changes, and re-state previously reported information.
8. *Accuracy*: The accuracy principle refers to achieving the degree of exactness and low margin of error in reported information necessary for users to make decisions with a high degree of confidence.
9. *Timeliness*: Reports should provide information on a regular schedule that meets users' needs and is in line with the nature of the information itself.
10. *Transparency*: Full disclosure of processes, procedures, and assumptions in report preparation are essential to its credibility.
11. *Auditability*: Reported information should be recorded, compiled, analysed, and disclosed in a way that would enable internal auditors or external assurance providers to confirm its reliability.

1.2 G3-Guidelines Part 2: Standard Disclosures

Part 2 specifies the basic content of a sustainability report (GRI 2006, 13):

1. *Strategy and Analysis*: Statement from the chief executive officer (CEO) and chair, or head of the organization who is independent of the reporting organization's executive management about the relevance of sustainability to the organization and its strategy.
2. *Organizational Profile*: The reporting organization has to indicate the nature of its regional, national or even international role and other basic data as the name of the organization, major brands, products and/or services with their quantities.
3. *Report Parameters*: First, parameters include an explanation of changes to previous reports in order to avoid misunderstandings and provide relations to other documents. Second, parameters explain (i) the way the report is developed (e.g., data measurement techniques and calculations, basic assumptions and techniques underlying estimations applied to the compilation of indicators and other information)

and (ii) which information may be relevant for certain stakeholders. Third, report borders and significant changes in size, structure, ownership, or products/services that may have occurred since previous reports are outlined. Fourth, a content index describes how a certain report refers to the G3-guidelines. Fifth, the organization which examines GRI conformity of the report is described.

4. *Governance, Commitments, & Engagement*: First, "Governance" describes the policy of the organization, responsibilities and competencies including issues like organization strategy, risk management organizational culture. Second, "Commitments to External Initiatives" shows the voluntary commitment of the reporter regarding social, economic and environmental initiatives. Third, "Stakeholder Engagement" points out how stakeholders are engaged along the reporting period which was not specifically for the purposes of preparing a report.
5. *GRI-Performance Indicators*: The reporter's performance is disclosed through economic, environmental and social indicators: a) The economic dimension concerns the organization's impacts on economic conditions of its stakeholders and on economic systems at local, national and global levels. b) The environmental dimension concerns an organization's impacts on living and non-living natural systems, including ecosystems, land, air, and water. The structure of environmental indicators covers input (material, energy, water) and output (emissions, effluents, waste) related performance. c) The social performance indicators refer to labor practices and human rights performance etc.

1.3 G3-Guidelines Part 3: Guidelines use and report compilation

Part 3 deals with how to use the guidelines in practice. Put more simply, this part proposes how to apply the GRI guidelines. According to the G3-Reporting Framework, the guidelines could be applied on three different levels, ranging from a more or less fragmented fashion to the full adoption "in accordance". This incremental approach will be further elaborated to a system of approximately 3-5 reporting levels reflecting different levels of apply the GRI Reporting Framework (GRI 2006, 24).

2. The eXtensible Business Reporting Language (XBRL)

- The development of an eXtensible Business Reporting Language (XBRL) has primarily been pushed by the American Institute for Certified Public Accountants (AICPA), intended to improve financial reporting in all its different procedures, processes, inside and outside a reporting organisation.

XBRL specifies the syntax of a report and can be defined as a number of report concepts as well as its respective contents. According to the framework approach reports consist of two levels: XBRL instances and taxonomies (XBRL 2006b). A certain report represents a so called instance document, which uses the taxonomy as the technical reference (XBRL). An XBRL instance again can be supported by several taxonomies (XBRL 2006c). A set of specific taxonomies is called Discoverable Taxonomy Set (DTS).

The Financial Reporting Taxonomies Architecture (FRTA 2005) is characterised through a number of so-called taxonomy schemas and linkbases. A taxonomy schema is an eXtensible Markup Language (XML)-Schema, usually a standardized schema (XSD). Several schemas describe the syntax and thus the interrelation of individual reports or parts to one another. Linkbases are link collections which enrich the syntax schema with semantics. Thus, questions can answered like is the information understandable or how were the numbers charged. According to the reference architecture of XBRL, linkbases have certain tasks:

- *Label*: Term for an XML-element. Several XSDs with label in different languages can be created. Thus, a specific representation of labels in reports is reached no matter of a certain XML-element name.

- **Reference:** The reference linkbase connects each XML-element with a reference, e.g. in financial reporting the paragraphs of the commercial code in which certain elements are prescribed.
- **Definition:** The definition linkbase connects XML-elements to a tree-like or net-like structure. Each branch of the is described in two directions (father to child and child to father).
- **Presentation:** This linkbase processes an order between brothers and sisters knots. Every link from a father to a son knot is provided thereby with an order number, which specifies the order within brothers and sisters. This sequence is important in case of presentation or in case of listing the elements and for further processing additional information.
- **Calculation:** The calculation linkbase contains the links for certain accounting procedure with indicators.

According to the XBRL reference architecture, a taxonomy consists of an XSD in which the XML-element names are listed, and the linkbases of the corresponding tasks. The link connections are provided through links or XLinks (eXtended Links, W3C Xlink 2001).

Each XBRL-instance document is also an XML-document. The substantial difference between XBRL and "pure XML" lays in semantics. XBRL does offer a method to express semantic meaning like "assets = liabilities + equity" further it also enables modeling of semantic connections (Binstock 2005, 5). Hence, the development of a taxonomy for a sustainability reporting reference architecture may be based on well established approaches in financial reporting.

3. Developing a Taxonomy for Sustainability Reports

The development of XML-based sustainability reporting is embedded in a broader research initiative in environmental informatics with the goal of advancing the standardisation of suitable document structures, finally to make use for internet-based environmental and sustainability reporting. The milestones of these efforts in standardisation and harmonisation are proposed as drafts (fig. 1), e.g. harmonised XML-DTD for environmental reports on first level (Lenz et al. 2002) and on second level (Isenmann et al. 2003), XML-schema for sustainability reports (Brosowski et al. 2004).

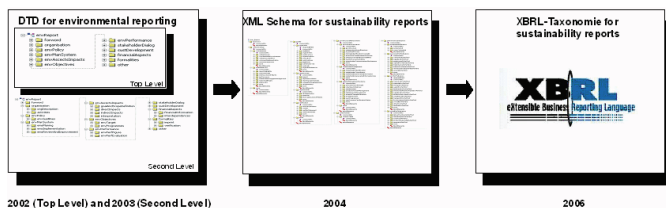


Fig. 1: Harmonisation and Standardisation of Environmental/Sustainability Reporting

Based on past experience, the goal of this effort is to improve sustainability reporting in terms of comparability, standardisation and reliability by adapting latest developments in financial reporting. Figure 2 provides an impression of the sustainability reporting reference architecture (DTS), highlighting the various relations between linkbases and taxonomy schema (XSD).

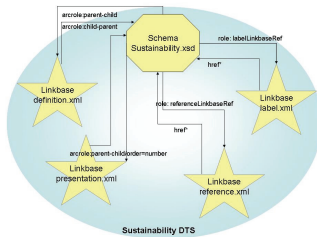


Fig. 2: Sustainability Reporting Reference Architecture

The XML-document “sustainability.xsd” lays at the heart and is the pivotal document of the sustainability reporting taxonomy. Any elements of the G3-guidelines are listed in this document as well as the anchors of any links or Xlinks. Here, all XML documents are joined together to a project where the characteristics of any links are specified (fig. 3).

```

<link:linkbaseRef xlink:type="simple" xlink:href="sustainability_label.xml"
xlink:actuate="onRequest" xlink:role="http://www.xbrl.org/linkprops/linkRef/label"
xlink:arcrole="http://www.w3.org/1999/xlink/properties/linkbase"/>
<link:linkbaseRef xlink:type="simple" xlink:href="sustainability_definition.xml"
xlink:actuate="onRequest" xlink:role="http://www.xbrl.org/linkprops/linkRef/definition"
xlink:arcrole="http://www.w3.org/1999/xlink/properties/linkbase"/>
<link:linkbaseRef xlink:type="simple"
xlink:href="sustainability_reference.xml" xlink:actuate="onRequest"
xlink:role="http://www.xbrl.org/linkprops/linkRef/reference"
xlink:arcrole="http://www.w3.org/1999/xlink/properties/linkbase"/>
<link:linkbaseRef xlink:type="simple"
xlink:href="sustainability_presentation.xml" xlink:actuate="onRequest"
xlink:role="http://www.xbrl.org/linkprops/linkRef/presentation"
xlink:arcrole="http://www.w3.org/1999/xlink/properties/linkbase"/>

```

Fig. 3: Embedding of the Linkbases

The XML-element names of the sustainability.xsd document represents the tree-like structure by the point linkage. The structure is readable for humans, but fixed on computer or parser level not yet. The way of naming the XML-elements has been derived from the FRTA 2005, accounting reference data and the equality of XML-element names and ID. The element type has to be selected from a set of XBRL:ItemTypes. Table 1 gives an overview of all data types, which may be used in the taxonomy for sustainability reports.

Item Type	Content Type	Representation
Xbrli:decimalItemType	DecimalItem	A decimal number
xbrli:periodType	Period	A period could be: forever, instant consisting of a DateUnion or duration, that is a length of time from startDate to endDate
xbrli:stringItemType	String	Character sequence, the mainly used element of sustainability reporting
xbrli:tupleType	Tuple	All elements of higher levels are tuple of elements of lower level.
xbrli:uriItemType	URI	Universal Resource Identifier (URI) is a string, which directs to a resource

Table 1: XBRL Item Types for Sustainability Reporting

The sustainability.xsd document provides merely the basis for the taxonomy. On the one hand, it contains all XML-elements, on the other any structure is missing, still.

As an example for connecting tasks in the sustainability reporting reference architecture, the XML-document "linkbase.xml" as a label linkbase links all XML-elements of the sustainability.xsd document to their literal meaning. For the taxonomy, labels in English and German were compiled to each XML-element that may be used for sustainability reports. English labels are abbreviations of corresponding G3-terms, German labels are translated accordingly (fig. 4).

```

<loc xlink:type="locator"
xlink:href="sustainability.xsd#sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization"
xlink:label="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization"
xlink:title="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization"/>
<label xlink:type="resource"
xlink:label="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization_de"
xlink:title="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization_de"
xlink:role="http://www.xbrl.org/linkpropos/label/standard" xml:lang="de">Erklärung und Priorisierung</label>
<labelArc xlink:type="arc"
xlink:from="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization"
xlink:to="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization_de"
xlink:show="embed" xlink:actuate="onRequest" xlink:arcrole="http://www.xbrl.org/linkpropos/arc/element-label" xlink:title="Go to label of
t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization_de"/>
<labelArc xlink:type="arc"
xlink:from="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization_de"
xlink:to="t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization"
xlink:show="replace" xlink:actuate="onRequest" xlink:arcrole="http://www.xbrl.org/linkpropos/arc/label-element" xlink:title="Go to label of
t_sustainReport.strategyAndAnalysis.keyRisksAndOpportunities.explanationAndPriorization"/>

```

Fig. 4: Linkbase "label.xml"

4. Conclusions

The GRI G3-guidelines provide a detailed proposal how sustainability reports may look like, in particular in terms of structure and contents. XBRL offers an efficient and standardised framework for business reporting in its different facets. A milestone of particular relevance is the existing XBRL Financial Reporting Taxonomies Architecture.

In this paper, we developed a sustainability reporting reference architecture according to the G3-guidelines, based on XBRL and in line with the XBRL Financial Reporting Taxonomies Architecture. On the one hand, sustainability reporting according with XBRL-based financial reporting seen as a proper information and communication technology standard provides a window for further improvements, especially in terms of automatization and efficiencies. On the other hand, an XBRL-oriented and ICT-conformal reference architecture fosters the standardisation of sustainability reporting. Furthermore, transaction costs when exchanging sustainability information between organizations can be reduced substantially. Finally, an XBRL-based sustainability reporting reference architecture may promote the deployment of software tools for a completely automated respectively semi-automated sustainability reporting.

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