

School of Accounting

**An Ontology for Sustainability Reporting Based
on Global Reporting Initiative (GRI) G4**

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**This thesis is presented for the degree of
Doctor of Philosophy
of
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Author's Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university..

A handwritten signature in black ink, appearing to read 'isy' followed by a stylized flourish.

Ilham Salman Yousif Yaldo

December 2015

Summary of the Thesis

The provision of information about the performance of an organization's economic, incorporated with environmental and social impacts is commonly referred to as a Sustainability Report. The history of sustainability reporting began at the beginning of the 20th century and the number of companies reporting on sustainability has increased worldwide. Several theoretical approaches explain the motivation for sustainability reporting. There are several national and international bodies that promote sustainability reporting and provide guidance. The research issues are that jurisdictions, including Australia permit the voluntary reporting of social and environmental matters resulting in a variety of information dissemination processes. There is a lack of a common accounting understanding of the regulations surrounding social and environmental disclosure. In addition, there is an apparent lack of an accepted framework for social and environmental reporting. There appears also to be an absence of financial accounting practices to capture and report on social and environmental impacts. To resolve these issues GRI guidelines are currently the "best practice" available. The reporting process would be greatly facilitated if a standardized methodology, viz., an ontology, was used to enable knowledge sharing between people and organizations, and people and computers; ontology can be used as a knowledge base to enable computer software to automatically generate sustainability reports and develop a library or reusable formats.

The aim of this research is to fill the gap by developing an ontology for Sustainability Reporting based on the latest guidelines (GRI G4). The chief research question is: What is the best approach to developing an Ontological Model for the knowledge domain Sustainability Reporting? The main objective of this research is to develop an ontology for Sustainability Reporting based on GRI G4. The methodology used in this research is a merger of several existing methodologies. The methodology adopted as a result of this applied research includes four phases: specification, conceptualization, formalization, and implementation. A requirement specification for Sustainability Reporting ontology was created by identifying the intended scope and purpose of scenarios for each of the phases of ontology. The classes, properties, and relationships for Sustainability Reporting based on GRI G4 were also identified. A conceptual model was formalized using UML. The implemented ontology used OWL language and protégé tool to encode 204 competency questions and subsequent SPARQL Queries. The resulting ontology was tested using instances data collected for four Australian companies listed on the ASX for financial year 2014, namely: ORG, AMC, TCL, and BHP Billiton.

As mentioned, the ontology of content was evaluated to meet the criteria of completeness, consistency, and conciseness, and 204 SPARQL Queries' answers were obtained establishing its utility and rationality. As a consequence, the developed ontology for Sustainability Reporting was validated. There is clear evidence that few Australian companies have adopted either GRI or other initiatives and standards for reporting and that this position needs to be addressed. The ontology as proposed in this thesis could be applied to correct this concern. The four companies used to test the ontology are from different industries and sub-industry classifications and, as a result, the findings are not generalizable outside of these industries. However, the main finding of this research demonstrates that the majority of instances contained within the GRI4 Guidelines was validated suggesting that the ontology framework is effective as a standardized form of reporting.

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List of Abbreviations

Abbreviation	Total name
AA1000	Assurance Standard
ACMAC	Australian Corporations and Markets Advisory Committee
AI	Artificial Intelligence
AIS	Accounting information system
ALE	Assets Liabilities Equity
AMC	Amcor Limited
ASX	Australian Securities Exchange
BHP	BHP Billiton
BMC	Business Model Canvas
BMO	Business Model Ontology
CEO	Chief Executive Officer
CER	Clean Energy Regulator
CERES	Coalition for Environmentally Responsible Economies
CFfFR	Conceptual Framework for Financial Reporting
CQ	Competency Questions
CR	Corporate Responsibility
CS	Computer science
CS	Corporate Sustainability
CSR	Corporate Social responsibility
DL	Description Logics
DMA	Disclosure on Management Approach
EC	Economic
EMA	Environmental Management Accounting
EN	Environmental
EPA	Event Principle and Account
ESG	Environmental, Social and Governance
EU	European Union
EUSS	Electric Utility Sector Supplements
EVG&D	Economic Value Generated and Distributed
FASs	Financial Accounting Standards
FOL	First-Order Logic
FRTA	Financial Reporting Taxonomies Architecture

Abbreviation	Total name
FY	Financial Year
GHG	Greenhouse Gas
GICS	Global Industry Classification Standards
GRI	Global Reporting Initiative
GWP	Global Warming Potential
HAP	Hazardous Air Pollutants
HR	Human Rights
IASB	International Accounting Standards Board
ICMM	International Council on Mining & Metals
IEEE	The Institute of Electrical and Electronics Engineers
IFRS	International Financial Reporting Standards
IIRC	International Integrated Reporting Committee
ILO	International Labour Organisation
IR	Integrated Report
IPIECA	International Petroleum Industry Environmental Conservation Association
IS	Information System
ISI	Information Sciences Institute
ISO	International Standardisation Organisation
IT	Information Technology
IUCN	International Union for Conservation of Nature and Natural Resources
KBPS	Knowledge-Based Problem Solving
KBSs	Knowledge-Based Systems
KE	Knowledge Engineering
KM	Knowledge Management
KPIO	Key Performance Indicator Ontology
KR	Knowledge Representation
LA	Labour Practice and Decent Work
LKS	Legal Knowledge Systems
MFCA	Material Flow Cost Accounting
NGERS	National Greenhouse and Energy Reporting Act 2007
NGOs	Non-Governmental Organisations
ODS	Ozone-Depleting Substances
OE	Ontological Engineering
OECD	Guidelines for Multinational Enterprises

Abbreviation	Total name
Org	Organization
ORG	Origin Energy Limited
ORSD	Ontology Requirements Specification Documents
OWL	Web Ontology Language
OWL-DL	Ontology Language – Description Logic
PM	Particulate Matter
POP	Persistent Organic Pollutants
PR	Product Responsibility
REA	Resource-Event Agent
REA-EO	Resource-Event Agent Enterprise Ontology
SD	Sustainable Development
SIGMA	Sustainability Integrated Guidelines for Management Project
SMEs	Small and Medium Size Enterprises/Entities
SO	Society
SOA	Service – Oriented Architecture
SOAu	Service Oriented Auditing
SSBMO	Successful Strongly Sustainable Business Model Ontology
TBL	Triple Bottom Line
TCL	Transurban Group
TOVE	Toronto Virtual Enterprise project
UML	Unified Modelling Language
UN	United Nations, Guiding Principles on Business and Human Rights. Implementing the United Nations “Protect, Respect and Remedy” Framework
UNEP	United Nations Environment Programme
UNGC	UN Global Compact ‘Ten Principles’
UNGC	UN Global Compact ‘Ten Principles’
USA	United State of America
VOC	Volatile Organic Compounds
WBSCD	World Business Council for Sustainable Development
WCED	World Council on Economic Development
WRI	World Resources Institute
XBRL	eXtensible Business Reporting Language
XML	Extensible Mark-up Language

ACIS 2014 Publication Acceptance

ACIS2014 notification for paper 194

ACIS2014 <acis2014-0@easychair.org>

Thu 18/09/2014 6:47 AM

To: Ilham Salman Yousif Valdo <ilham.balo@postgrad.curtin.edu.au>

Dear Ilham Valdo,

Congratulations. Your paper titled as An Ontological Model for Corporate Social Responsibility (CSR) Reporting Based on Global Reporting Initiative GRI G4 with number 194 has been accepted at ACIS2014. Please make sure you resubmit your paper in MSWord document, with any revisions and proper format, by 15 October. We look forward to seeing you in Auckland.

William Wang
David Pauleen

ACIS Program Co-Chair

----- REVIEW 1 ----- PAPER: 194

TITLE: An Ontological Model for Corporate Social Responsibility (CSR) Reporting Based on Global Reporting Initiative GRI G4

AUTHORS: Ilham Valdo and Hai Dong

OVERALL EVALUATION: 2 (accept)

Relevance to the conference theme and track topic: 3 (fair)

Originality: 3 (fair)

Theoretical/academic contribution: 4 (good)

Appropriateness of the research/study method: 4 (good)

Relevance and clarity of content presentation: 3 (fair)

Adequate review of previous literature: 3 (fair)

----- REVIEW -----

The paper aims to develop a model for corporate social responsibility reporting using an ontological approach. It contributes to knowledge development in that this approach appears not to have been previously explored. The paper is reasonably structured and written. The developed model would need to be empirically validated. To this extent, the paper is conceptual in nature and provides a starting point for the development of a global reporting format for software development.

----- REVIEW 2 ----- PAPER: 194

TITLE: An Ontological Model for Corporate Social Responsibility (CSR) Reporting
Based on Global Reporting Initiative GRI G4

AUTHORS: Ilham Valdo and Hai Dong

OVERALL EVALUATION: 2 (accept)

Relevance to the conference theme and track topic: 4 (good)

Originality: 4 (good)

Theoretical/academic contribution: 4 (good)

Appropriateness of the research/study method: 3 (fair)

Relevance and clarity of content presentation: 4 (good)

Adequate review of previous literature: 4 (good)

----- REVIEW -----

This paper is well written: the structure is clear, and it provides a reasonable summary of literatures. It provides useful insight of model development to solve a real-world problem, which is a good contribution. It will be interesting to see the empirical test based on the concept/model of this paper.

Authors may want to modify the presentation for the section of Background, in a form of diagram or table for example. It will make the massive information easier for the readers, such as the tables and figures used in the paper.

To my mother

Chapter 1. Introduction

1.1. Introducing Sustainability Reporting

In today's business world, the responsibility of organizations has greatly extended beyond simply achieving profitability and now the onus is on shareholders to consider social and environmental impacts (Deegan 2014). Reporting by corporations on economic, environmental and social dimensions, referred to as "Sustainability", is seen as a step towards a sustainable global economy that combines long-term profitability with social justice and environmental protection (UMEP et al. 2013).

Terms such as Corporate Social Responsibility (CSR), Corporate Responsibility (CR), Corporate Sustainable Development, Corporate Sustainability (CS), Social Responsibility, Corporate Citizenship, Triple Bottom Line (TBL), and Environmental, Social and Governance (ESG) are used interchangeably (Vujic and Ivanis 2012; Freeman and Hasnaoui 2010; Dahlsrud 2008; van Marrewijk 2003; Herzig and Schaltegger 2006).

The history of sustainability reporting began at the beginning of the 20th century with employee reporting, social reporting, environmental reporting, triple bottom line reporting and sustainability reporting (Buhr 2010). Deegan (2012, 1195) argues that "it is difficult to provide a precise definition of CSR reporting". Some authors contend that there is currently no suitable definition for sustainability reporting (English and K.Schooley 2014).

Kolk (2004) and Herzig and Schaltegger (2006) claim that since the mid-1990s the number of companies reporting on sustainability has increased substantially and new forms of corporate sustainability reporting are being developed, resulting in reporting contents and formats being subject to change from year to year.

Several theoretical approaches that explain the motivation for sustainability reporting include: accountability theory, legitimacy theory, and political economy and stakeholder theory (Deegan 2014; Buhr 2010).

Regarding environmental and social reporting, several major issues need to be addressed: a lack of consistent measures to capture CSR activities; the absence of regulatory requirements; disclosure is voluntary; different report forms; and environmental and social costs and benefits (Deegan 2014; Jones and Jonas 2011). To resolve these issues, there are several national and international bodies that promote sustainability reporting and provide guidance; these include: Global Reporting Initiative (GRI), the International Standards Organization (ISO), the World Business Council for Sustainable Development (WBCSD), AccountAbility, and the Sustainability Integrated Guidelines for Management (SIGMA) Project (Buhr 2010). Christofi, Christofi, and Sisaye (2012) argued that it was important to have standardized sustainability reporting by corporations.

The GRI guidelines are generally accepted as “best practice” reporting and are widely used by organizations around the world as the basis for their environmental and social reporting (Deegan 2014). The guidelines provide guidance on how to write and what to write and present principles that guide report content and report quality (Joseph 2012).

Gray and Bebbington (2001, 160) argue that “an accounting system that cannot recognise social or environmental issues is very unlikely to encourage that organization to take serious account for such matters”. They also commented that the traditional accounting information system does not adequately assist the management of social and environmental concerns (Gray and Bebbington 2001). Thus, a new information system for sustainability reporting is required as it has become an important source of monetary and non-monetary, quantitative and qualitative information (Herzig and Schaltegger 2006).

An ontology methodology plays an important role in the design of information systems (Church and Smith 2007). It provides a formal specification for the concepts within a domain and the relationship between those concepts (Gruber 1993). There are many existing definitions of ontology, arguments about what the definition of ontology is or ought to be (Uschold and Tate 1998), and debates on what is the best definition (Borst 1997). Studer, Benjamins, and Fensel (1998, 184) define ontology as a “formal, explicit specification of a shared conceptualisation”. This is one of the most comprehensive definitions from those available in the literature (Corcho, Fernandez-Lopez and Gomez-Perez 2007).

There are several studies that develop ontologies in different aspects of accounting but little ontological research exists within the accounting domain. For example, Chou, Vassar, and Lin (2008) developed an ontology concept model for profit and loss accounts and implemented it for Microsoft's NET software. Teller (2008) established ontology of accounting notions to represent the entire domain knowledge based on International Financial Reporting Standards (IFRS). Chou and Chi (2010) proposed an ontological model comprising Event, Principle and Account (EPA) for accounting principles. Smeureanu et al. (2011) developed ontology for Corporate Social Responsibility based on the guidelines proposed by the 'ISO 26000 Standard for Social Responsibility'. Weigand and Elsas (2012b) introduced a model-based auditing approach as a design artefact that includes a corresponding business modelling language. Weigand, Johannesson, and Bergholtz (2015) introduced a service accounting model based on a formal ontology approach and propose some adaptations to the Resource-Event Agent (REA) model. From the literature review, ontology for Sustainability Reporting based on GRI G4 does not exist. Thus, the aim of this research is to fill the gap by developing an ontology for Sustainability Reporting based on GRI G4.

1.2. Sustainability Reporting practices in Australia

Deegan (2014) states that since the late 1990s, the reporting on environmental and social issues has become standard practice, and is now more widespread, more extensive; it is a stand-alone report found in many large national and multinational companies in several industrial sectors and countries. One international study found that the USA, followed by Japan, South Africa, China, Brazil, Spain, Sweden, Australia, Korea, and a number of other EU Member States provide the highest number of reports per country. However, in countries such as in Denmark or France, there is a lower number of GRI reports because they have fewer large companies (UMEP et al. 2013).

However, because of the voluntary reporting status applicable to most developed countries, the incidence of company involvement is small. This situation also applies to Australian companies where, for example for 2014 data, only 16% of the top ASX listed firms provide any form of separate sustainability reporting.

The top 200 companies listed with the Australian Securities Exchange (ASX) for the 2014 financial year (FY) ranked in terms of Market Capitalisation that adopted GRI or other initiatives are listed in Appendix A. The data was collected from

<http://datanalysis.morningstar.com.au.dbgw.lis.curtin.edu.au/af/screening/advanced>

accessed on 30th of Sep. 2015.

Table A.1 in Appendix A shows in detail the company names, ASX codes, and their Global Industry Classification Standards (GICS) industry, GRI version adopted, name of report, forms of report, and web site for each company. It can be seen that only 32 companies applied GRI with different versions G3, G3.1, and G4 with core or comprehensive options and specific standard disclosures for the organizational sectors sector such as ICMM, IPIECA, UN, and EUSS.

Table A.2 in Appendix A shows company names, ASX codes, and GICS Industry, other standards or initiatives, name of report, form of report and web site. It can be seen that only 9 companies have chosen different standards such as the FTSE4GoodIndex (specific performance indicators relevant to hospitals), Global Real Estate Sustainability Benchmark, Sustainability relevant to Fletcher Building, ISO 31000, National Greenhouse and Energy Reporting Act 2007 (NGERS) with Clean Energy Regular (CER), ISO 9001 and ISO 27001. In addition, under the same title report or the name of the report is Corporate Governance Statement, Environment Regulation, and Our Strategy. Likewise, for the companies that adopted GRI, the forms have been taken from annual reports, online, and stand-alone sources.

Table 1.1 below provides a summary of the top 200 Australian companies listed with the ASX according to GICS Industry and the number and percentage of companies that adopted GRI G3, 3.1, 4, and other initiatives for FY 2014.

Among the top 200 Australian companies listed with the ASX in terms of high rank of Market Capitalization and 23 GICS Industry, the number and the percentage of companies that have chosen GRI guidelines G3, G3.1, and G4 are 32, or 16%. The details are: 5: 7: 20; and, 2.5%: 3.5%: 10% respectively as presented in Table 1.1. Therefore, the highest number and percentage has increased to 20 companies, increasing the percentage to 10% for G4. In addition, the highest number of companies is four that these belong to the Metals & Mining GICS Industry. Then, the Real Estate Investment Trusts GICS Industry has only three companies. There are only two companies for each of the following GICS Industries: Oil, Gas & Consumable Fuels, Transportation Infrastructure, and Commercial Services & Supplies have adopted G4. Besides, the following GICS Industry: Food & Staples Retailing, Containers & Packaging, Multi-Utilities, Road and Rail, Chemicals, Diversified Financial Services, and Construction Materials have only one company. Finally, the number of other GICS Industry companies is nil.

Among the top of 200 Australian companies listed within the ASX in terms of high rank of Market Capitalization and 23 GICS Industry, the number and the percentage of companies that have chosen other initiatives are 9 and 4.5%. The Diversified Consumer Services have two companies. The following GICS Industry: Food & Staples Retailing, Construction Materials, Health Care Providers & Service, Real Estate Management & Development, Specialty Retail, Software, and Media have one company.

In conclusion, there is clear evidence that few companies in Australia are involved in Sustainability Reporting either according to GRI or other initiatives, and the number has increased only slightly following the introduction of GRI G4 owing to unregulated nature of disclosure. Participation rates may increase if processes for collecting and completing information were simplified and standardized, providing a major incentive for this research.

Table 1.1 Summary of top 200 ASX listed companies for FY 2014

Order	GICS Industry**	Number of companies (N=200)	Number of companies voluntarily providing sustainability report			
			GRI G3	GRI G3.1	GRI G4	Other initiatives
1-	Banks		0	1	0	0
2-	Metals & Mining		2	0	4	0
3-	Food & Staples Retailing		1	0	1	1
4-	Capital Markets		1	0	0	0
5-	Oil, Gas & Consumable Fuels		0	2	2	0
6-	Real Estate Investment Trusts		0	1	3	0
7-	Transportation Infrastructure		0	0	2	0
8-	Containers & Packaging		0	0	1	0
9-	Commercial Services & Supplies		0	1	2	0
10-	Insurance		0	1	0	0
11-	Multi-Utilities		0	0	1	0
12-	Road and Rail		0	0	1	0
13-	Chemicals		0	0	1	0

Order	GICS	Number of companies	Number of companies voluntarily providing sustainability report			
14-	Diversified Financial Services		0	0	1	0
15-	Construction Materials		0	0	1	1
16-	Independent Power and Renewable Electricity Producers		1	0	0	0
17-	Electric Utilities		0	1	0	0
18-	Health Care Providers & Service		0	0	0	1
19-	Real Estate Management & Development		0	0	0	1
20-	Diversified Consumer Services		0	0	0	2
21-	Specialty Retail		0	0	0	1
22-	Software		0	0	0	1
23-	Media		0	0	0	1
Total number of using GRI		32	5	7	20	0
Total number of using other initiatives		9	0	0	0	9
Total number		41	5	7	20	9
Percentage of using GRI		16%	2.5%	3.5%	10.0%	0
Percentage of using other initiatives		4.5%	0	0	0	4.5%

** This refers to Global Industry Classification Standards.

1.3. Research issues

The process of reporting on social and environmental matters is voluntary or unregulated. There is a lack of a common accounting understanding of the regulations surrounding social and environmental disclosure. In addition, there is an apparent lack of an accepted framework for social and environmental reporting. There appears also to be an absence of financial accounting practices to capture and report on social and environmental impacts. Current practices for reporting on social and environmental matters vary considerably from the conceptual framework available for reporting on social and environmental issues. To resolve these issues, GRI guidelines are generally accepted and are currently considered the “best practice” (Deegan 2014). The reporting process would be greatly facilitated if ontology were used firstly to communicate between people and organizations, and people and computers. This is because the Sustainability Report provides a basis for communication between organizations and stakeholders and can resolve issues by sharing a vocabulary or common language as ontology requires consensus on the meaning of the terms leading to standardization. Secondly, ontology can be used as a knowledge base to enable computer software to automatically generate sustainability reports and develop a library of reusable ontologies.

1.4. Research questions

The principal research question is: What is the best approach to developing an Ontological Model for the knowledge domain of Sustainability Reporting? In this study, this research question is divided into the following sub-questions:

1. What is the most appropriate methodology for developing ontology for the knowledge domain of Sustainability Reporting?
2. What techniques are appropriate for developing ontology for the knowledge domain of Sustainability Reporting?

1.5. Research objectives

Following on from the above, the main objective of this research is to develop ontology for Sustainability Reporting based on GRI G4, and this will be achieved through the following sub-objectives:

1. Identifying the classes, data properties, object properties for Sustainability Report based on GRI G4.

2. Transforming a conceptual model into a formalized model by using the Unified Modelling Language (UML) to represent ontology for Sustainability Report.
3. Implementing an ontology by using OWL language and Protégé tools to encode the 204 competency questions. Subsequent SPARQL Queries will be created after implementing all classes, data properties, object properties identified within GRI G4. Data instances will be collected online for four Australian companies listed with the ASX, including Origin Energy Limited, BHP Billiton, Amcor Limited, and Transurban Group for FY 2014.
4. Evaluating the developed ontology for Sustainability Report by a process of verification and validation. Schema Metrics and Knowledgebase Metrics will be used to verify the ontology. To validate the ontology, the answers to 204 SPARQL Queries are extracted and the ontology for a Sustainability Report is validated.

1.6. Research methodology

Numerous methodologies have been developed for ontology lifecycles in the literature. Until the mid-1990s, this process was an art rather an engineering activity. Then, ontology development became a branch of engineering due to the development of principles, methods, methodologies and technologies related to ontology processes and the ontology lifecycles (Corcho, Fernandez-Lopez and Gomez-Perez 2007). The methodology used in this research is a unique combination of several methodologies and include those proposed by Uschold and Gruninger (1996), (Lopez et al. 1999; Fernández-López, Gómez-Pérez and Juristo 1997b) and Noy and McGuinness (2001). For the Uschold and Gruninger methodology, the purpose and scope are indentified (Uschold and Gruninger 1996). For the METHONTOLOGY methodology, three activities - specification, conceptualization, and implementation - are described in detail (Lopez et al. 1999; Fernández-López, Gómez-Pérez and Juristo 1997b). For the Noy and McGuinness methodology, the activities that are discussed in detail are conceptualization and implementation (Noy and McGuinness 2001). These methodologies are covered in Chapters three and four of this dissertation.

1.7. Research significance

The development of ontology for Sustainability Reporting based on GRI G4 is unique. It enables: knowledge sharing; a common understanding of terminology for sustainability reporting among people and multiple organizations; the reuse of knowledge by organizations through data stored in repositories; and ontology can be updated to new generations of GRI; and computer software are able to automatically generate sustainability reports.

As discussed earlier in this introduction, it would benefit all companies to embrace the need to provide separate reports pertaining to relevant issues associated with sustainability. The development of a standardised reporting methodology using an ontology model will encourage firms to present useful and meaningful information. As discussed, relatively few firms have adopted any form of reporting, which leaves them vulnerable to public criticism and claims for compensation etc., when unforeseen issues are raised by stakeholders. The expense will exceed the benefits. Firms will be better able to devise long-term strategies that will aid them and any interested parties.

1.8. Thesis structure

The thesis is structured as follows: Following this introductory chapter, Chapter 2 presents an overview of the evolution of Sustainability Reporting and GRI. Then, Chapter 3 reviews the literature related to ontology. Chapter 4 provides an overview of the solution in the first section, followed in the second section by ontology for the ‘General Standard Disclosure’ class. The ontology for ‘Economic Category’ class is presented in Chapter 5. The ontology for ‘Environmental Category’ class is detailed in Chapter 6. The final ontology for ‘Social Category’ is documented in Chapter 7. The ontology implementation and evaluation are presented Chapter 8 which is necessarily detailed. The final chapter provides a summary of the overall thesis and findings including the limitations and recommendations for future work in this topic area.

1.9. Summary

This chapter introduced Sustainability Reporting and discussed the research issues of this thesis. The research questions are stated and research objectives explained. Next, the research methodology that will be used is identified and the significance of the study is discussed. Finally, the thesis structure is presented. Chapter 2 examines the evolution of sustainability reporting and GRI.

Chapter 2. Evolution of Sustainability Reporting and GRI

2.1. Introduction

A comprehensive Sustainability Reporting Framework that is the most widely used around the world has been established and improved by the Global Reporting Initiative or GRI. The GRI is a leading organization in the sustainability field. The GRI Sustainability Report is a report issued by organizations (private, public, or non-profit) that reports their economic, environmental and social impacts, and the performance of their activities, products and services. Such reporting takes a Triple Bottom Line (TBL) approach. GRI considers an organization's impacts and performance not only on in terms of its local economy but also in terms of its sustainable global impact. Many organizations, regardless of their type, size, sector or location, voluntarily use the GRI Framework to measure and report on their performance according to specific principles and indicators. This framework is a reporting system which includes the Reporting Guidelines, "the core document" or the "cornerstone" of this framework providing guidance on how organizations can disclose their sustainability performance and increase accountability (Moneva, Archel and Corra 2006) in addition to Sector Guidance and other resources. G4 is the latest version of GRI's Sustainability Reporting Guidelines released in May 2013 after several previous versions of the Guidelines: the first version in 2000; the second generation (G2) in 2002; and the third generation (G3) in 2006. In 2011, the GRI updated and published the G3.1 (Global Reporting Initiative 2015d).

Global Reporting Initiative, the Global Reporting Initiative logo, Sustainability Reporting Guidelines, and GRI are trademarks of the Global Reporting Initiative (Global Reporting Initiative 2000-2011 Version 3.1, 15) (Global Reporting Initiative 2000-2011 GRI Version 3.1f, 49). GRI includes sustainability reporting that principally applies to environmental issues as well as economic and social impacts. However, in Australia, GRI guidelines are for voluntary use by business firms for reporting on the three aforementioned dimensions of their activities, products, and services (Global Reporting Initiative 2002, 1).

This chapter includes the following sections and will be followed by a conclusion:

2.2: Literature review of sustainability and reporting; 2.3: Brief history of GRI; 2.4: Overview of the latest GRI (4) version; 2.5: Development of Sustainability Reporting Guidelines Versions

2.2. Literature review of sustainability and reporting

As aforementioned, currently organizations are responsible for their social and environmental performance in addition to financial performance (Deegan 2014). These three dimensions of responsibilities are known as Corporate Social Responsibility (CSR). CSR largely comprises theories, approaches and terminologies that describe the phenomenon of corporate responsibility in society (Garriga and Melé 2004). CSR has become important to businesses since the 1980s as people became more aware of the impacts of organisations' business activities on society and the environment.

(Jones and Jonas 2011), reporting on activities of this nature, were driven by a desire to further social ends beyond the interests of participating companies. Regarding environmental and social reporting, several major issues need to be addressed; these include: a lack of consistent measures to capture CSR activities; absence of regulatory requirements; disclosure is voluntary; different report formats are used by participating firms; and environmental and social costs and benefits have been ignored (Jones and Jonas 2011; Deegan 2012) . To resolve these issues, several national and international bodies promote and provide guidance on sustainability reporting.

Sustainability reporting is voluntary in most jurisdictional regimes although it is evident that large firms are beginning to embrace the concept. A 2011 KPMG study of Fortune 250 indicated that 80% of companies issued annual CSR statements and 45% of the largest companies in 22 countries issue CSR reports. The concept is just as important for small and medium-sized enterprises (SME). Figures for the top 200 ASX 2014 firms were provided in Appendix A and Table 1.3 demonstrate that the concept is less popular amongst Australian firms. It is also interesting to note that in the same KPMG study mentioned above, it was identified that 40% of the G250 reports received formal external assurance, with major accounting firms as the leading providers. It is apparent that some firms take this form of reporting seriously. However, as indicated in the introduction to this thesis, the form and content of reports vary considerably, whether or not firms elect to follow one form of presentation (e.g., GRI) or another.

The latest G4 guidelines refer to the need for integrated reporting. Rather than providing separate financial and sustainability reports, companies will hopefully begin integrating the information from two reports into one. As stated on the latest GRI website, "Understanding the links between financial results and sustainability impacts is critical for business managers, and increasingly connected to long- and short-term business success" (Global Reporting Initiative 2015d).

In addition to public pressure, what are the factors that influence firms to provide CSR reports? English and K.Schooley (2014) believe that sustainability rankings provided by various mutual funds (including ethical funds) can affect whether a firm's securities are included depending on whether or not they report CSR issues. The Dow Jones Sustainability Index also provides considerable influence in this department. Firms are conscious that positive CSR initiatives attract ethical investors, although there is a disadvantage to this in that firms are reticent about including negative issues unless ongoing litigation is likely to impact on the bottom line.

Interested parties in Australia follow lines of reasoning similar to those of other major economies in relation to CSR. For example, the Australian Corporations and Markets Advisory Committee (ACMAC) (Committee 2006) accepts the notion that although the term has no fixed definition, it implies that firms have a commitment, beyond the letter of the law, to behave ethically, which includes concern about protecting the environment and improving the quality of life of workers and their dependants. ACMAC's emphasis is clearly teleological in the sense that it encourages firms to look beyond short-term gains and consider long-term societal impacts.

2.2.1. Theories underlying the need for sustainability reporting

The aforementioned motivation to report is associated with Stakeholder Theory (Freeman 1984) where emphasis is placed on ethical reasoning and the voting strength of influential parties (including customers, investors and existing shareholders). However, the moral imperative for universal sustainability ought to consider the rights of all parties, regardless of their political or economic strength (English and K.Schooley 2014). Gray and Adams' (1996) formulation of the accountability model presents another aspect of stakeholder theory that requires business firms to provide for the expectations of broader sectors of society, although these are often, as with CSR reporting, not codified within the law.

An alternative to the Stakeholder Theory is the Legitimacy Theory and its associated notion of social contract. Luft Mobus (2005) reported a negative correlation between the mandatory disclosure of environmental legal sanctions and subsequent regulatory violations using firms in the U.S. oil refining industry. Within the ambit of this theory, firms are expected to provide for activities (CR, CSR, and ESG); otherwise, they would be perceived as breaching their social contract with the communities they serve.

Again, it could be argued, that pressure to provide sustainability reports is motivated by Institutional Theory (Scott 1995) whereby organizations are subjected to the pressures imposed by other firms and managers who adopt such strategies for economic or social reasons. From a sociological perspective, isomorphic and mimetic tendencies encourage entities to copy or follow after the practices of others.

Enlightened self-interest is a by-product of economic theories that encourages sustainability reporting on the premise that carefully orchestrated (or censored) reporting of activities by entities will attract custom if it is appropriately identified as positive. Further, Jones and Jonas (2011) present Political Cost Theory as an incentive to firms to voluntarily provide CSR reports on the basis that such action will postpone actions by authorities to impose regulation, that will result in costly demands and expectations of conformity that would stymie economic freedoms and increase costs.

As mentioned above, although CSR reporting has attracted attention since the early 1990s, the manner of reporting varies considerably. The most popular initial form involved the disclosure of environmental and social aspects of business as accompaniments to annual financial statements. Then as national firms became multinational, the largest began producing separate stand-alone social and environmental reports. Popular amongst these are BHP Billiton, Coca-Cola, McDonald's, Disney and Puma (Deegan 2014). All of these firms have at some time in recent history been subject to well publicized litigations and investigation involving environmental and social issues.

In Australia, litigation against recalcitrant firms has a history that far predates the widespread introduction of CSR reporting, mainly involving issues associated with social and environmental matters connected with its precursor, triple bottom line reporting. At the international level, concerns about climate change and the negative impacts of businesses have attracted the attention of government agencies who are taking action to ensure firms become more accountable in the area of sustainable development. A new and important stakeholder has been recognized, which acknowledges the concerns referenced by the World Commission of Environment and Development over 25 years ago that recommended: "... (sustainable) development that meets the needs of the present world without compromising the ability of future generations to meet their own needs" (WCED 1987, 4). On the other hand, corporate sustainability has been defined as "any state of a business in which it meets the needs of its stakeholders without compromising its ability also to meet their needs in the future. A company has to ensure that its operations are sustainable in regard to its economic, social and environmental performance" (Hockerts 1999, p.31). Normative issues of equity and a fair distribution of global wealth and available resources amongst the nations (present and future) became an ideal for many (Deegan 2014).

2.2.2. Accounting policy objections to sustainability reporting by business firms

Deegan (2014) presents a number of objections to incorporating environmental and social costs within the accepted fabric of financial reporting. These objections are summarized below and represent material concerns, many of which demand a significant reorientation of strategic thinking, that is, a shift in mindsets that would ultimately necessitate changes in the conceptual framework governing reporting content. The role of the recently established International Integrated Reporting Committee (IIRC) is also being stultified, in terms of meeting its objective of creating a globally accepted international framework...“that elicits from organizations material information about their strategy, governance, performance and prospects in a clear, concise and comparable format” (www.theiirc.org). As it stands, companies voluntarily publishing sustainability reports make little attempt to link the information with that provided in statutory financial reporting statements (Eccles and Krzus 2010).

Issues affecting the capturing of social and environmental performance factors in generally-accepted financial accounting statements include (Deegan 2014):

- International Accounting Standards Board (IASB) Conceptual Framework for Financial Reporting was established with the purpose of satisfying the information needs of financial stakeholders for investment type decisions and excludes consideration of broader needs within society.
- Business firms escape the need to report social and environmental costs while under the mistaken belief that such are difficult to quantify and hence judged as immaterial. They also tend to rely on the concept that events need to be probable and measurable with reasonable accuracy, criteria that often apply to sustainability issues (Deegan 2014, 448) “A practical problem associated with recognizing social and environmental externalities is that the process of attributing ‘costs’...is by its nature very judgmental and such a process relies on estimates and guesstimates” something accountants wish to avoid.
- Recommended discounting liabilities associated with the cost of Climate Change have been set at rates that firms argue are too low, providing them with opportunities to argue their case and thereby avoid including them in financial statements.
- Financial accounting adopts the entity convention, which permits them to avoid expenses incurred by stakeholders, i.e., shareholders, other organisations (e.g., government) and broader populace.

- Tied in with the argument about public utilities and associated externalities is the understanding that (ignoring fines etc.) businesses recognise only those assets that are under their control and hence other expenses connected with common or public goods (e.g., air or water pollution) need not be reported or capitalised.
- There is the long-standing tradition, respected in the law, that property owners (i.e., shareholders) have priority and that generated profits belong to them and that they deserve to be maximised. However, at the same time, employee wages are unavoidable direct costs that ought to be minimised. In this context, the social cost incurred by reducing number of employees in order to maintain profit levels is an acceptable policy.

The matters listed above provide strong arguments against the feasibility of incorporating sustainable reporting within the context of existing financial accounting reporting systems. Therefore, other systems of reporting need to be considered. Before discussing the emerging importance of GRI reporting processes, other options deserve mention. Firstly, and arguably, the most well-known in academic circles in the recent past is Triple Bottom Line Reporting.

2.2.3. Triple Bottom Line (TBL) Reporting

By definition, TBL reporting offers a mechanism for providing financial statement users' information about all three aspects (economic, environmental and social) of business performance. Sustainability in this context is considered an admirable long-term objective of any business enterprise. However, according to Brown, Dillard, and Marshall (2005), TBL reporting has not been effectively developed as a realistic reporting option. The biggest problem facing users of TBL has been the difficulty (as mentioned earlier) of turning social and environmental impacts into quantifiable figures; hence, many reports include much narrative and little that can be directly comparable to the more finite financial data.

What has tended to occur in practice is that companies providing TBL reports tend to treat each performance component differently. For example, financial reporting relies chiefly on the economic maxim that profits ought to be maximised. The same philosophy can hardly be applied to the two lines of reporting. Each has its own set of priorities, which ought to concentrate on such things as equity and full disclosure and take into account various externalities relating to factors possibly outside the control of the organization. This is infeasible in practice and any dollar balance cannot be reasonably offset against one another. Imagine, for example offsetting the estimated cost of negative social implications, such as the likely death or injury of users of some product against the economic line of profit. The 'estimate' is likely to vary depending on the perceptions of users and is therefore strongly subjective.

As Deegan (2014) suggested, there needs to be a separate conceptual framework for social and environmental reporting, as discussed in the next section. At the time of writing, the Global Reporting Initiative appears to have made the most progress in this direction.

2.2.4. Comparable Initiatives that Promote Promotion of Sustainability Reporting

In recent times, independent and governmental organizations around the world have been active in promoting sustainability reporting (Adams and Narayanan 2010). The GRI represents what is arguably the best way forward in the process of establishing worldwide recognition as the option most likely to achieve the development of an acceptable framework for reporting sustainability matters (Deegan 2014). This initiative discussed in the following sections of this chapter and has been adopted as the basis upon which a viable ontology will be developed for adoption by business enterprises. Other bodies at both national and international levels have made contributions to the reporting process and deserve some mention here. These include the International Standards Organisation (ISO), the World Business Council for Sustainable Development (WBCSD), AccountAbility (AA1000) and the Sustainability Integrated Guidelines for Management (SIGMA) project (Adams and Narayanan 2010).

- ISO is a non-governmental body that has been developing standards for over 149 countries and in 1996 released guidelines that deal specifically with environmental management - ISO 14001. The standards are mainly procedural in nature, although progress is being made in communicating how related matters ought to be reported and includes workshops and seminars that encourage the adoption of GRI initiatives.
- WBCSD consists of an amalgamation of the Business Council for Sustainable Development and the World Industry Council for the Environment, including Chief Executive Officer (CEOs) from many companies across nearly 200 countries. Comprehensive guidelines include those relating to accountability and reporting. It works to assist businesses in the development of a reporting process that considers social and environmental aspects appropriate to their area of concern and which appeal to a broad range of stakeholders. Specific guidance is provided with respect to planning, construction and distribution of sustainability reports and works on the assumption that reports of this type will become mandatory in the long term.

- AA1000 is a British innovation established in 1999, aiming to clarify how business reporting considers issues of social and ethical accountability in particular. Sustainability is a major feature of the principles and standards developed by AA1000, which are achievable when organizations provide transparency, responsiveness and compliance, within the specified guidelines and processes and jurisdictional requirements. Performance is subject to external audits, and reports are made available to all relevant stakeholder groups.
- SIGMA is another UK initiative established in 1999 to encourage businesses to “meet the challenges posed by social, environmental and economic dilemmas, threats and opportunities, and become the architects of a more sustainable future” (SIGMA 1999, 8). In addition, to encourage accountability at all levels of management, SIGMA guidelines attempt to make businesses aware of forms of capital to which they have access which are ordinarily ignored within the ambit of financial reporting, namely human, natural social capital. The SIGMA management framework provides for phases of development that facilitate the effective construction and dissemination of sustainability constructs within management.

Out of the four initiatives described above, only WBCSD goes some way towards providing guidance on how sustainability reporting might be affected within business organizations. The others deal principally with the establishment of standards and procedural arrangements for developing accountability structures. In Australia, the Department of the Environment and Heritage provides toolkits to businesses and encourages participants to report the impact of their operations on the environment and society.

The GRI Guidelines are generally accepted as “best practice” reporting and are widely used by organizations around the world as the basis for their environmental and social reporting (Deegan 2014). The GRI guidelines have become the de facto international standard for reporting environmental, social, and economic performance. The GRI is also a collaborating centre of the United Nations Environment Programme, and is governed by its board of directors, which is the final decision-making authority (English and K.Schooley 2014). The history of this global initiative will now be examined in some detail.

2.3. History of the Global Reporting Initiative (GRI)

A disclosure framework for sustainability information as an idea was conceived in 1997-1998. The GRI is the result of a partnership of the United Nations Environmental Program (UNEP) and the Coalition for Environmentally Responsible Economies (CERES).

GRI is an undertaking comprising multi stakeholders. It is an entity with an international presence and its mission is to develop guidelines for applicable sustainability that are disseminated globally to organisations that want to voluntarily report on various aspects of their business: economic status, environmental impact of operations, and the social aspects of what they produce in terms of activities, products and services (Global Reporting Initiative 2000, 29-39).

The GRI's Reporting Framework was developed through a process of systematic, consensus-seeking dialogue with a large network of individuals from over 60 countries, representing stakeholder groups from the domains of business, civil society, labour, academia and other professions.

The Exposure draft for GRI was released in 1999, followed by the first version of the GRI Guidelines in June 2000. Then, in 2002, a second version (G2) was published in Johannesburg, South Africa, at the World Summit for Sustainability Development. It established recognition and a high profile among governments, businesses, the general public and labour participants, and were one of only two initiatives mentioned in the official government declaration issued at the conclusion of the Summit. In October 2006, the third version (G3) was released. In March 2011, version 3.1 was released as an update and completed the G3 Guidelines. These expanded guidelines provided for reporting human rights, gender and community impacts. Furthermore, G3.1 enabled organizations to be transparent about a wider range of sustainability issues (Global Reporting Initiative 2015d). In May 2013, the latest universally applicable, fourth generation of GRI was implemented, which is aimed at both updating and simplifying the reporting process. Participating organisations will be able to concentrate their attention on matters material to their business.

2.4. Overview of the latest GRI Version (G4)

2.4.1. Sustainability report G4

A GRI report is a sustainability report that uses the [Global Reporting Initiative's](#) sustainability reporting guidelines to publish a company or organization's economic, environmental and social impacts caused by its everyday activities. There are different formats for this report which are web-based or print, stand-alone or combined with annual or financial reports (Global Reporting Initiative 2015d) .

Any type of organization (private, public, or non-profit) regardless of size, sector or location such as multinational enterprises, SMEs (small and medium-sized enterprises, public agencies, NGOs (non – governmental organizations), and trade associations (Global Reporting Initiative 2015a) can produce a GRI report.

A Sustainability Report according to GRI (4) version is a report that is based on the G4 Guidelines, that: satisfies the “in accordance with” criterion option; identify material Aspects based on the impacts and expectations of stakeholders; indicates Aspect Boundary; describes organizational approaches to managing each of its material Aspects (DMA); reports indicators for each material Aspect according to reporting options; provides a gri content index; harmonizes with other internationally accepted standards; and offers guidance on how to link the sustainability reporting process to the preparation of an Integrated Report (IR) as developed by IIRC (Global Reporting Initiative 2015b).

G3.0/G3.1 has been modified to produce the G4 version; these changes are examined in the following sections.

2.4.2. Reporting framework GRI G4

G4 introduces a new structure for the guidance documents. The Guidelines are presented in two parts: the first part “Reporting Principles and Standard Disclosures” (Global Reporting Initiative 2013a) focuses on “What to report”; while the second part “Implementation Manual” (Global Reporting Initiative 2013b) focuses on “How to report” (KPMG 2013). However, not all the sectors have guidelines. G4 has Sector Supplements for ten sectors whereby the content of the GRI G3.0/G3.1 guidelines were reorganized to fit the G4 guidelines which are: Airport Operators, Food Processing, Construction and Real Estate, Media, Electric Utilities, Mining and Metals, Event Organisers, NGOs, Financial Services, Oil and Gas (Global Reporting Initiative 2015c). Figure (2.1) shows the Reporting Framework for GRI G3.0/G3.1 and adjusted according to G4 Guidelines.

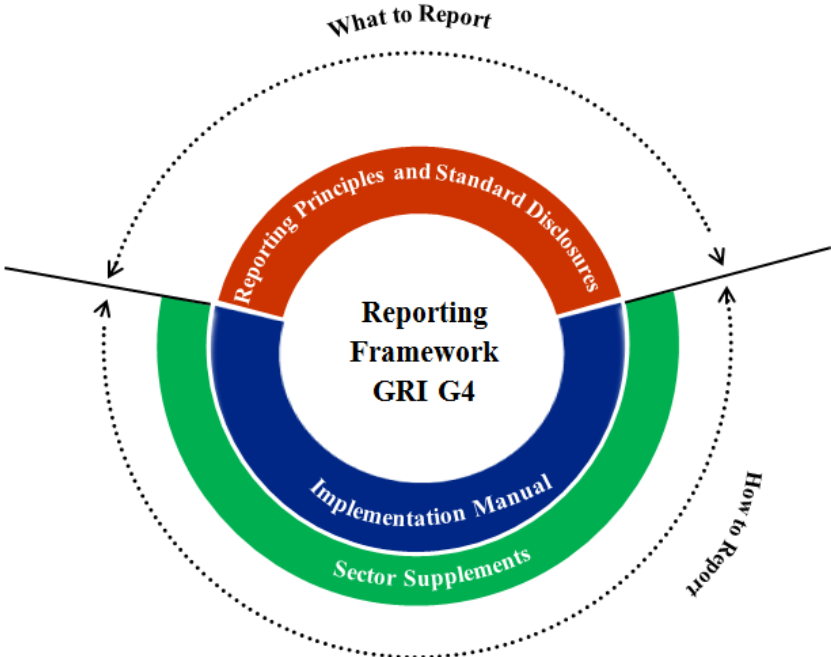


Figure 2.1 Reporting Framework for GRI G3.1 adjusted according to G4 Guidelines (Global Reporting Initiative 2000-2011 GRI Version 3.1f, 3) and (Global Reporting Initiative 2000-2006 GRI Version 3.0f, 3)

The six principles for defining report quality in G4 (Balance, Comparability, Accuracy, Timeliness, Clarity, and Reliability) (Global Reporting Initiative 2013a, 17-18) are not very different from those of G3.1/G3.0 as there are only minor changes to the text of these principles (Global Reporting Initiative 2000-2011 GRI Version 3.1f, 13-17).

The GRI G3.0/G3.1 framework contains general and sector-specific content that can be generally applied to the reporting of an organization's sustainability performance. The Guidelines of Sustainability Reporting consist of two parts: The first part is "Principles and Guidance" which define report content and ensure the quality of reported information and "Indicator Protocols" for each of the performance Indicators listed in the Guidelines to assist the reporter on "How to Report". The second part is "Standard Disclosures" and "Sector Supplements" to assist the reporter with "What to Report" (Global Reporting Initiative 2000-2011 GRI Version 3.1f, 3). Disclosures comprise: Strategy and Profile, Management Approach, and Performance Indicators (Global Reporting Initiative 2000-2011 GRI Version 3.1f, 19).

2.4.3. Reporting options and disclosures

The G4 Guidelines introduced an "In Accordance with" option which is either "Core or Comprehensive" to guide reporting process. In addition, there is a third option whereby organizations use the standards but do not report "In Accordance with" these Guidelines. The two "in accordance with" options are provided in G4 as explained in section 3 of the Reporting Principles and Standard Disclosures (Global Reporting Initiative 2013a).

The GRI describes sustainability reporting as a process. The inputs of this process are principles and guidance and the outputs are Standard Disclosures. There are two different types of Standard Disclosure: General Standard Disclosure and Specific Standard Disclosure. The reporting disclosure is dependent on the option that has been chosen by an organization. This research is focussed on developing ontology for General Standard Disclosure and Specific Standard Disclosure as types of Standard Disclosures according to GRI G4.

G4 Guidelines offer 58 "General Standard Disclosure" items and it is required to be reported for both options and it is depended on the "In Accordance with" option has chosen by the organization and on the outcome of the organization's processes for defining report content and its stakeholder engagement.

- Core option: For "General Standard Disclosure" G4-1 to G4-34 and G4-56 items must be reported.
- Comprehensive option: For all 'General Standard Disclosure' G4-1 to G4-58 items must be reported.

For both options, “Specific Standard Disclosure” should focus only on material Aspects.

The General Standard Disclosures are divided into: Strategy and Analysis, Organizational Profile, Identified Material Aspect and Boundary, Stakeholder Engagement, Report Profile, Governance, and Ethic and Integrity.

The Specific Standard Disclosure is organized into Economic, Environmental and Social categories. Each category includes Disclosure on Management Approach (DMA) and Indicators for material Aspects identified. G4 consists of 46 Aspects and 91 indicators. The details are presented in Chapters 4 to 7.

- Core option: An organization must disclose the Generic DMA and at least one indicator per material Aspect.
- Comprehensive option: An organization must disclose the Generic DMA and all relevant indicators for all material Aspects.

The above description can be seen in Figure (2.2) below.

GRI DISCLOSURES		COMPREHENSIVE	CORE
General Standard Disclosures	Strategy and Analysis	All	All except G4-2 (discussion of impacts, risks and opportunities)
	Organizational Profile		All
	Identified Material Aspects and Boundaries		All
	Stakeholder Engagement		All
	Report Profile		All
	Governance		All except G4-35 to G4-55 (management intensive governance disclosures)
	Ethics and Integrity		All except G4-57 to G4-58 (management intensive ethics disclosures)
Specific Standard Disclosures	Disclosures on Management Approach	For all material aspects	For all material aspects
	Indicators (including sector-specific metrics)	All Indicators associated with each material Aspect	At least one Indicator associated with each material Aspect

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Figure 2.2 GRI G4 reporting options
(Mooney 2015)

Accordingly, G4 replaces application levels A, B and C that indicate the extent to which the report covers the GRI Reporting Framework criteria in G3.0/G3.1 (Global Reporting Initiative 2000-2011 GRI Version 3.1a) to meet new criteria options. Salterbaxter MSLGROUP (2015) argued that, rather than indicating the quality of a company’s disclosure, these levels are mistakenly taken as indicators of the company’s sustainability.

The Standard Disclosure reporting in G3.0/G3.1 is different from that in G4, as application Levels A, B, and C were required as disclosures in G3.0/ 3.1 (Global Reporting Initiative 2000-2011 GRI Version 3.1a).

Application Levels A and B required a report on all criteria listed for Profile Disclosure. However, Application Level C required a report on part of the criteria listed for the same.

For Disclosures on Management Approach: a report for Application Level C was not required, but it was required for each Indicator Category for Application Levels A and B.

For Performance Indicators and the Sector Supplement Performance Indicators: Application Level C required reporting on a minimum of any 10 Performance Indicators, including at least one for each of the social, economic, and environment items. Application Level B required reporting fully on a minimum of any 20 Performance Indicators, at least one from each of the economic, environment, human rights, labour, society, product responsibility items.

Application Level A required a response for each core and Sector Supplement indicator with due regard to the materiality Principle by either reporting on the indicator or explaining the reason for its omission.

2.4.4. Material Aspects

KPMG (2013) claimed that materiality is not a “new concept” and it takes “centre stage” in the G4 Guidelines. The G4 describes the preparation of a sustainability report as an “iterative process” and the core of this process is “identifying material Aspects” for both options (Global Reporting Initiative 2013a). G4 defines Material Aspects that reflect the significance to the organization’s economic, environmental and social impacts, and the influence on stakeholder assessments and decisions (Global Reporting Initiative 2013a, 2013b). An Aspect is regarded as material if it meets either one of the conditions (KPMG 2014). In order to meet the G4 Guidelines, organizations must meet new requirements to explain why the selected Aspects are material, how they are managed and how they are evaluated - known as DMA.

Aspect refers to the list of subjects covered by the Guidelines for which GRI Indicators and DMA have been developed. All details of GRI G4 Aspects are presented in Chapters 5 to 7.

KPMG (2013) sees that the G4 Guidelines make more explicit links between materiality Aspects and the Disclosure on Management Approach and a new requirement for explaining the process used to identify the material Aspects. In addition, G4 Guidelines lead to shorter reports and are more focused on material Aspects in comparison to G3.0 and G3.1.

The Global Reporting Initiative (2015a) agreed that the G4 emphasis on materiality Aspects leads to reports that are more strategic, more focused and more credible, and easier for stakeholders to navigate than G3.1/G3.0.

DMA guidance is divided into “Generic Disclosure Management Approach”, and “Aspect-Specific Disclosure Management approach”. G4 proposes one general format for Generic Disclosure Management Approach for each material Aspect identified (Mooney 2015) as shown in Figure (2.3).

GRI G4 requires that, for Generic DMA Guidance, organizations must consider it first and then if Aspect-specific DMA Guidance is provided, organizations report in more detail. However, GRI G4 has not been developed for every Aspect in the Guidelines, but provides for only 23 out of 46 Aspects (Global Reporting Initiative 2013a, 45).



Figure 2.3 G4 Generic disclosure management approach format for each material Aspect identified
(Global Reporting Initiative 2013b, 64-65; 2013a, 46)

2.4.5. Aspect Boundary, Range, and Topic

After identifying the material Aspect, it is important to consider whether the impacts occur within or outside the organization or both (Global Reporting Initiative 2013a, 28-29). This is the “Boundary of Aspect” which is a “description of where impacts occur for each material Aspect. In G4, Aspect Boundaries vary based on the material Aspect identified” (Global Reporting Initiative 2013b, 244). An organization must report on its material Aspects, and how it manages or approaches them both within and outside of the organization. The outside of the organization refers to all entities and elements that are not included in the organization’s consolidated financial statements or equivalent documents (Global Reporting Initiative 2013b, 31).

In addition, the “Range” of Aspects covered in a report is called the “Scope”, and “Topic” refers to “any possible sustainability subject” (Global Reporting Initiative 2013b, 31). Therefore, G4 contains a broader range of impacts for material Aspects than did the G3 and G3.1.

2.4.6. Defining the report content process

The process for defining the report content as set out in the G3.1 and G3 Guidelines (Global Reporting Initiative 2000-2011 GRI Version 3.1f) has changed in G4 (Global Reporting Initiative 2013b). Contrary to the principles that designed to be used to define the report content as defined in G3.0 and G3.1 have not changed in G4 (Global Reporting Initiative 2013a, 16-17; 2000-2011 GRI Version 3.1f, 8-13; 2000-2006 GRI Version 3.0f, 8-13)

In order to be a transparent sustainability report, there are four principles that define report content, which are: Stakeholder Inclusiveness, Sustainability Context, Materiality, and Completeness. The two components for each Reporting Principle are: definition and description of how and why to apply the Principle. The organization should consider both of these two components (Global Reporting Initiative 2013b, 9-12).

There are four steps in this process: Identification, Prioritization, Validation, and Review (Global Reporting Initiative 2013b, 32-39). Figure (2.4) shows the process for defining report content.

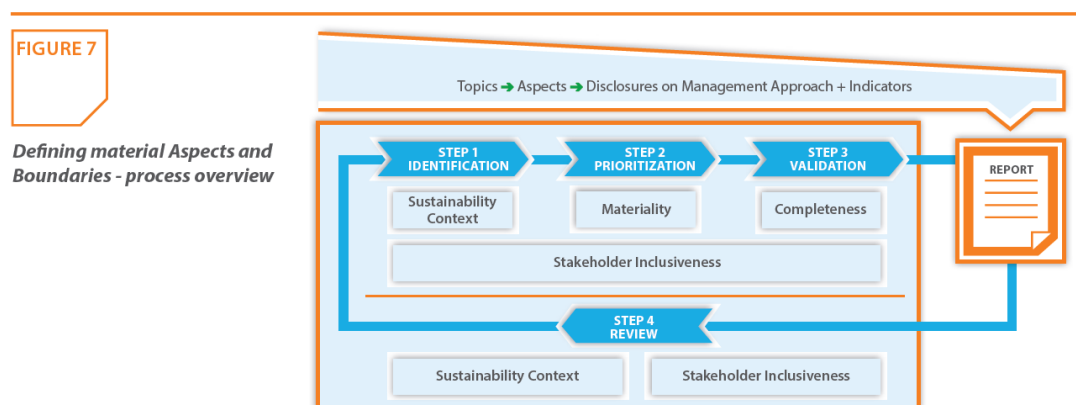


Figure 2.4 Process for defining report content (Global Reporting Initiative 2013b, 32).

1. Identification step:

This refers to identifying Aspects and any other relevant topics that reflect the organization's relevant economic, environmental and social impacts or that influences the assessments and decisions of stakeholders regardless of whether these impacts occur within or outside of the organization. Identification should be based on the principles of Sustainability Context and Stakeholder Inclusiveness (Global Reporting Initiative 2013b, 33-35).

2. Prioritization step:

This involves “what to analyse”, “analysis of influence on stakeholders assessments and decisions” and “significance of organization's economic, environmental and social impacts”, and then determining the material Aspects in terms of thresholds and the level of coverage. The principles of Materiality and Stakeholder Inclusiveness are applied to prioritize the Aspects (Global Reporting Initiative 2013b, 35-38).

3. Validation step:

In this sentence, the material Aspects are assessed against Scope, Aspect Boundaries, and time. To finalize the identification of report content, the principles of Completeness and Stakeholder Inclusiveness are used. A list of material Aspects and their Boundaries are the output of the above three steps. This list enables the organization to define the Specific Standard Disclosures in terms of DMA and Indicators (Global Reporting Initiative 2013b, 38-39).

4. Review step:

This involves considering again those Aspects that were material in the previous reporting period and to use the feedback from this step in the Identification step for the next reporting cycle. The Stakeholder Inclusiveness and Sustainability Context are applied in this step.

2.4.7. New and revised standard disclosures

G4 introduced the following new standard disclosures:

1. New supply chain requirement: G4 requires organizations to disclose:
 - Supply chain as in G4-12 for both core and comprehensive options “description of the supply chain”. In addition, the Procurement Practice Aspect and EC9 are introduced to identify the negative impacts of the supply chain.
 - Number of suppliers screened using environmental, labour practices, human rights, and society impacts criteria (EN32, LA14, HR10, and SO9).
 - Number of grievances relating to supply chain impacts about environmental, labour practices, human rights, and society that are filed, addressed, and resolved through formal grievance mechanisms (EN34, LA16, HR12, and SO11).
 - Significant actual and potential negative impacts for environmental, labour practice, human rights, and society that are identified in the supply chain (EN33, LA15, HR11, and SO10).
 - Actions taken to prevent, mitigate or remediate the environmental, labour practice, human rights, and societal impacts identified in the supply chain (EN33, LA15, HR11, and SO10).
2. New general standard disclosures introduced for “Governance”

G4 introduced 27 new disclosures including 10 new standard disclosures on governance. The organization must disclose according to G4-35 to G4-55 for comprehensive options. Information on composition, involvement and authority of the reporting organization’s highest governance body is essential in these standard disclosures.

3. Introduce general standard disclosures “Ethics and Integrity”

G4 developed this general standard disclosure that consists of three classes ranging from G4-56 to G4-58. G4-56 relates to an organization’s values, principles, standard and norms that should be disclosed whether the organization has chosen core or comprehensive options. G4-57 relates to an organization’s internal and external mechanisms for seeking advice on ethical and lawful behaviour. Whereas G4-58 relates to an organization’s internal and external mechanisms for reporting concerns about unethical or unlawful behaviour and matters of integrity. Both G4-57 and 58 are specified for comprehensive reporting option.

4. New specific standard disclosures for energy consumption outside the organization's EN4 and energy intensity EN5 are introduced.
5. A new specific standard disclosure for the intensity of Greenhouse Gas (GHG) emissions -EN18- is introduced.
6. Several revised general and specific standard disclosures

G4 modified G3.1 by inserting the following additional points: G4-1, G4-13, G4-18, G4-20, G4-21, G4-27, G4-32, G4-33, G4-34, G4-37, G4-38, G4-40, G4-41, G4-44, G4-45, G4-47, G4-49, G4-51, G4-53, EC2, EC4, EC6, EC9, EN3, EN6, EN7, EN8, EN9, EN10, EN13, EN15, EN16, EN17, EN19, EN20, EN21, EN22, LA2, LA6, LA13, HR4, HR5, HR6, SO3, SO4, SO5, and SO6. In addition, some content in standard disclosures has been reduced such as G4-23, EN27, HR10, HR12, and PR6. In addition, content from standard disclosure has been moved to "Guidance" such as for the Economic Category, the goals and performance, policy, and additional contextual information terms in DMA for G3.1 moved to Guidance in DMA for G4.

For Environmental Category, the goals and performance, policy, organizational responsibility, training and awareness, monitoring and follow-up, and additional contextual information terms in DMA for G3.1 moved to "Guidance" in DMA for G4. For Labour Practices and Decent Work Sub-Category, the goals and performance, policy, organizational responsibility, training and awareness, monitoring and follow-up, and additional contextual information terms in DMA for G3.1 moved to "Guidance" in DMA for G4. For the Human Rights Sub-Category, the goals and performance, policy, organizational risk assessment, impact assessment, organizational responsibility, training and awareness, monitoring, follow-up and remediation, and additional contextual information terms in DMA for G3.1 moved to "Guidance" in DMA for G4. For the Society Sub-category, the goals and performance, policy, organizational responsibility, training and awareness, monitoring and follow-up, and additional contextual information terms in DMA for G3.1 moved to "Guidance" in DMA for G4. For the Product Responsibility Sub-Category, the goals and performance, policy, organizational responsibility, training and awareness, monitoring and follow-up, and additional contextual information terms in DMA moved for G3.1 to "Guidance" in DMA for G4 (Global Reporting Initiative 2013c).

2.4.8. G4 Alignment with other frameworks

G4 links some of Standard Disclosures to the UN Global Compact ‘Ten Principles’ (UNGC) reporting framework. The UNGC is the largest policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption. The ten principles are derived from the United Nations Declarations and Conventions (UMEP et al. 2013). For example, G4-10 and G4-11, all EN Aspects and indicators, Labour/ Management Relations are linked to UNGC.

In addition, G4 links to Guidelines for Multinational Enterprises (OECD). The OECD Guidelines provide recommendations for responsible business conduct in areas such as employment and industrial relations, human rights, environment, information disclosure, combating bribery, consumer interests, science and technology, competition, and taxation (UMEP et al. 2013). For example, G4-11, Economic Performance Aspect indicators (EC1-EC4), all EN Aspects and indicators, Occupational Health and Safety Aspect, Training and Education Aspect, Labour Practices Grievance Mechanisms Aspect and LA16. Whereas For Non-Discrimination Aspect and HR3, Freedom of Associated and Collective Bargaining Aspect and HR4, Child Labour Aspect and HR5, Forced or Compulsory Labour Aspect and HR6 are linked to both OECD and UNGC.

Moreover, for the overall Society Aspect, the following Aspects: Local communities Aspect and SO1 and SO2; Anti-corruption Aspect and SO3, SO4, and SO5; and Public Policy Aspect and SO6 are linked both to OECD and UNGC. While the following Aspects and indicators are linked to OECD: Anti-competitive Behavior and SO7, Compliance and SO8, Supplier Assessment for Impact on Society and SO9 and SO10, Grievance Mechanisms for Impacts on Society and SO11.

Finally, for the Product Responsibility Aspect, the Customer Health and Safety Aspect and PR1 and PR2 are linked to OECD.

2.4.9. G4 and Integrating Reporting (IR)

KPMG (2014) believes that GRI and IR reporting frameworks have the materiality concept as their cornerstone: reporting principles; report content elements; reporting options; and reporting boundary. They conclude firstly, that a clear bridge can be established between G4 and IR if the material Aspects are determined by an organization to create and to sustain value in the short, medium and long term. Secondly, there is significant alignment and largely aligned in the reporting principles, report content elements and Standard disclosures, core reporting option and boundary of G4 and IR.

2.4.10. G4 GRI content index

The GRI content index is the “navigation tool” (Global Reporting Initiative 2000-2011 GRI Version 3.1a). Each “In Accordance” option has its own content index. It includes only the material Aspects. It helps stakeholders to find relevant content through page number references. It offers a transparent format to communicate external assurance.

A column is added to gri GRI content index to indicate whether the Standard Disclosure item has been externally assured. In contrast to G3.0 and G3.1, it uses “+” to signal external report assurance. Note that the assurance process and the assurance on adherence to the GRI principles have not changed either. The use of external assurance is recommended by GRI but it is not required to be “in accordance” with the G4 Guidelines (Global Reporting Initiative 2013a, 13).

2.4.11. Increase in the number of Standard Disclosure

G4 has increased the number of Standard Disclosures. For General Standard Disclosures has become 58 points. For The number of Specific Standard Disclosures has been increased to 91 indicators categories as follows: 9 indicators for Economic Aspects, 34 indicators for Environmental Aspects, 16 indicators for Labour Practices and Decent Work Aspects, 12 indicators for Human Rights Aspects, 11 indicators for Society Aspects, 9 indicators for Product Responsibility Aspects.

G3.1 had total performance indicators 84 as 55 core and 29 additional. For Economic Performance 9: 7, 2 as core and additional indicators respectively. For Environmental Performance 30: 17, 13 as core and additional indicators respectively. For Labor Practices And Decent Work Performance 15: 10, 5 as core and additional indicators respectively. For Human Rights Performance 11: 9, 2 as core and additional indicators respectively. For Society Performance 10: 8, 2 as core and additional indicators respectively. For Product Responsibility Performance 9: 4, 5 as core and additional indicators respectively (Global Reporting Initiative 2000-2011 GRI Version 3.1c, 2000-2011 GRI version 3.1d, 2000-2011 GRI Version 3.1b, 2000-2011 GRI Version 3.1e, 2000-2011 Version 3.1, 2000-2011 GRI Version 3.1).

G3.0 had total indicators 79 as 49 core and 30 additional. For Economic Performance 9: 7, 2 as core and additional indicators respectively. For Environmental Performance 30: 17, 13 as core and additional indicators respectively. For Labour Practices And Decent Work Performance 14: 9, 5 as core and additional indicators respectively. For Human Rights Performance 9: 6, 3 as core and additional indicators respectively. For Society Performance 8: 6, 2 as core and additional indicators respectively. For Product Responsibility Performance 9: 4, 5 as core and additional indicators respectively (Global Reporting Initiative 2000-2006 GRI Version 3.0a, 2000-2006 GRI Version 3.0b, 2000-2006 GRI Version 3.0d, 2000-2006 GRI Version 3.0c, 2000-2006 GRI Version 3.0g, 2000-2006 GRI Version 3.0e).

2.5. Conclusion

As mentioned previously, the GRI reporting framework is a generally accepted framework for an organisation's economic, environmental, and social performance. This framework has increasingly developed for more than eleven years, starting with the first version of GRI Guidelines in 2000 to the latest version, GRI (4), published in 2013. In this latest version, eleven significant changes have been made: 1) a new structure of reporting framework is presented in two parts; 2) it introduces two options criteria "In Accordance" with "Core or Comprehensive" or without "In Accordance" guidelines to guide the reporting process; 3) G4 has two types of Standard Disclosure: General Standard Disclosure and Specific Standard Disclosure that make the reporting disclosure different according to the option that has been chosen by the organization. G4 offers 58 items for General Standard Disclosure, and identifies 46 Aspects; 91 performance indicators for Specific Standard Disclosure; 4) identified material Aspects are the centre stage of G4 and there is an explicit link between materiality Aspects and DMA; 5) Aspect Boundary is broader to include sustainable impacts inside or outside the organization or both; 6) the report content process has been redefined; 7) there are minor changes in the text of the reporting principles; 8) G4 introduced new Standard Disclosures and revised some of them; 9) G4 is in alignment with UNGC and OECD reporting frameworks; 10) G4 is in alignment with IR; 11) gri content index with page number id specifically refers to material Aspect, and whether the report is assured by an external third party. Therefore, the development of GRI is a flexible process enabling multi-stakeholder needs to be met. There are a number of issues associated with CSR performance measurement and reporting.

Conventional financial accounting has its limitations, especially given the difficulty of quantifying social and environmental costs. In addition, there is no standard for measuring sustainable performance. Currently, research on ontology is widespread and focussed on the areas of information science and business. Although there have been many attempts to develop a framework for CSR reporting by a number of industries and government bodies in many countries, the GRI G4 version as best practice is the leader among voluntary worldwide TBL reporting systems and the framework most frequently used by companies.

Arguments for the development of an ontology approach to reporting GRI issues will be discussed in Chapter 3. In this chapter, it has been necessary to discuss and describe the nature of reporting for sustainability as it has evolved in recent decades, and to discuss in some detail how the existing guidelines have been organised. It is evident from the changes to the GRI that these are the result of demand for greater accountability in relation to social and environmental matters. The question remains as to how best to organise and disseminate the potentially vast amount of information that needs to be considered

Chapter 3. Literature Review for Ontology

3.1. Introduction

The word ‘ontology’ means different things to different individuals and communities. If ontology is used simply as a noun (“Ontology”¹ with initial capital letter) this implies a philosophical context. However, if the word is not capitalized initially (i.e. ontology) it is used as a numeric and implies the involvement of some computation (Guarino and Giaretta 1995; Guarino 1998).

Since the early nineties, interest in developing and using ontologies has greatly increased mainly due to a shared and common understanding of communication of some domains between people and computers (Uschold and Tate 1998).

In this research, attention will be given to ontology from a computer and information science perspective. This chapter contains the following sections:

- 3.2 What is ontology?
- 3.3 Uses of ontology
- 3.4 Methodologies to build ontologies
- 3.5 Components of ontology
- 3.6 Ontology research in Accounting Domain
- 3.7 Summary

All sections above are explained respectively.

3.2. What is ontology?

The following subsection is specified to define ontology from philosophical perspective and from computer science perspective.

3.2.1. Definitions of ontology

There is some contention amongst researchers about what ontology is or ought to be (Uschold and Tate 1998), involving much debate about what constitutes the best definition (Borst 1997). In addition, as Weller (2010) has mentioned that there has not been a consensual acceptance of any particular definition during the last few years of ontology research. The following definitions are taken from the literature.

¹ The first appearance of the term ‘Ontology’ itself was in the early seventeenth century (Weller 2010, 115; Welty and Guarino 2001, 51).

3.2.1.1. Definition of ontology from philosophical perspective

Gruber (2008, 1) and Studer, Benjamins, and Fensel (1998, 184) state that ontology from a philosophical perspective assumes it to be a “theory of the nature of existence”. Chandrasekaran, Josephson, and Benjamins (1999, 20) provide a definition from the philosophical perspective, stating that it is the “study of the kinds of things that exist” – in other words, it explores the characteristics of such things. In addition, there appears to be some confusion between the term ontology and the term “epistemology” which is concerned with “knowledge and knowing” (Gruber 2008, 1), and they are often and mistakenly used interchangeably.

3.2.1.2. Definition of ontology from computer science (CS) perspective

Neches et al. (1991) provided a definition of ontology from the perspective of computer science: “An ontology defines the basic terms and relations comprising the vocabulary of a topic area as well as the rules for combining terms and relations that define extensions to the vocabulary”. Despite the fact that Gruber’s definition is considered to be too broad, it is generally accepted by most researchers (Borst 1997, 12; Gruber 2009, 1964; Guarino 1997, 307). Gruber suggests that it is “an explicit specification of a conceptualization” (Gruber 1993, 1995; Gruber 2009).

This definition distinguishes between ontology and conceptualization. Ontology does not specify a conceptualization; it confirms it. Also, the extent to which this definition is accepted depends on the purpose of the ontology and whether a more detailed definition is required (Guarino 1997).

Guarino and Giaretta (1995, 25) presented seven definitions of ontology. They address ontology from the philosophical perspective, and similarly to Gruber, they see it as a specification of a conceptualization, a level of knowledge, and symbolic level of logic theory.

Swartout et al. (1996) define ontology as a set of hierarchically structured terms for any knowledge domain on which a knowledge base can be built.

Bernaras, Laresgoiti, and Corera (1996) believe that ontologies clearly define concepts, properties, and relationships any domain knowledge so that they can be represented in a knowledge base. The knowledge base aspect is common to both of the aforementioned definitions. Therefore, all the above definitions miss the formal language as presented by Studer, Benjamins, and Fensel.

Studer, Benjamins, and Fensel (1998, 184) definition of ontology as “a formal, explicit specification of a shared conceptualisation” is one of the most comprehensive definitions available. They define the terms: Explicit, Formal, and Shared as follows:

- Explicit: all elements of ontology are obviously defined.
- Formal: refers to the fact that the ontology should be machine readable, which excludes natural language.
- Shared: refers to consensual knowledge agreed on to be accepted by a group of people.

Guarino, Oberle, and Staab (2009, 3) define conceptualization as “an abstract, simplified representing of the domain of interest, objects, concepts, and the relationship among them”.

Studer, Benjamins, and Fensel (1998) believe that ontology is not only as a representation of some knowledge domain but also it reflects a the extent to which there is consensus about that domain knowledge.

Hoekstra (2009, 86-87) viewed ontology as “standardisation process” since the purpose of ontology is to “capture a shared view on some domain” and therefore, ontology is “a social activity” since ontology specification aimed “consensus on the meaning of the term”.

Guebitz, Schnedl, and Khinast (2012) claim that all these definitions of ontology from an Information System (IS) perspective agree upon identify concepts, properties and the relationships between them for any knowledge domain , but it represents a machine-readable language from a CS perspective. Further, the definition introduced by Studer, Benjamins, and Fensel (1998) is one of the most comprehensive forms available in the literature (Corcho, Fernandez-Lopez and Gomez-Perez 2007). This research is based on this definition.

3.3. Uses of Ontology

Gruninger and Lee (2002, 40) summarized the uses of ontology for communication between people, people and computer, and between the computers. Uschold and Gruninger (1996, 98) identify similar categories of uses for ontologies.

Studer, Benjamins, and Fensel (1998, 184) state that the main reason for building ontology are “sharing and reusing of knowledge bodies in computational form”. Whereas (Chandrasekaran, Josephson and Benjamins 1999, 21; Noy and McGuinness 2001, 1; Gomez-Perez, Fernandez-Lopez and Corcho 2004) state that the reasons for developing ontologies are: the sharing of domain knowledge between human and software agents, reuse, making explicit domain assumptions, the separation of domain knowledge from the operational knowledge and the analysis of information outcomes. In order to provide a shared vocabulary of concepts, relations, and conditions, the main aim of the ontology is to avoid issues arising in the communication between people, organizations and software systems (Uschold and Gruninger 1996, 117, 124). Hence, some authors believe that a domain’s ontology is the heart of any system of knowledge representation; without ontology and the conceptualizations that form the bases of knowledge, a vocabulary for representing knowledge is worthless (Chandrasekaran, Josephson and Benjamins 1999, 21).

In summary, the main uses of ontology is to share common understanding of terms for specific domain in the real world between people and computers, and to reuse it; if it is not reused, it provides limited benefits.

3.4. Methodologies to build ontologies from scratch

It should be noted that Ontological Engineering (OE) refers to any activities involved in the ontology building process and also include lifecycle, principles and methodologies used for its construction (Corcho, Fernandez-Lopez and Gomez-Perez 2007, 44). The researcher will discuss in the following subsection the ontology development process, the ontology lifecycle, and methodologies for building ontologies.

3.4.1. Definition and sub-division of Methodology

The aim of this sub-section is to present the main methodologies and methods used to build ontologies from scratch. These methodologies are related to its lifecycle. The lifecycle as a development process consists of different activities to design and evaluate ontologies. Until the mid-1990s this process was an “art rather an engineering activity” (Gomez-Perez, Fernandez-Lopez and Corcho 2004, 107).

There were several workshops and conferences held on Ontological Engineering (OE) (Gomez-Perez, Fernandez-Lopez and Corcho 2004, 107). Various methodologies and methods discussed will be reviewed to build ontology by reference to these and the extant literature. Most methods identify similar components and for efficiency, reference will be made to them in terms of commonalities. Firstly, it is necessary to define what constitutes a methodology and its components.

According to Casellas (2011, 57), the methodology of ontology building as the set of procedures and guidelines that assist in the building and evolution of ontology both throughout or during some parts of its lifecycle.

Gomez-Perez, Fernandez-Lopez, and Corcho (2004, 109) depict methodology in graphical terms comprising terminological techniques and methods as illustrated in Figure 3.1. In order to perform the tasks constituting a process, certain techniques and methods are implemented. More simplistically, methodologies involve processes and detailed technical information to guide these processes. Moreover, every process involves certain activities which require the completion of specific tasks. There is logical order in methods that is not required of techniques. In other words, techniques are the application of methods (Fernández-López and Gómez-Pérez 2002, 1).

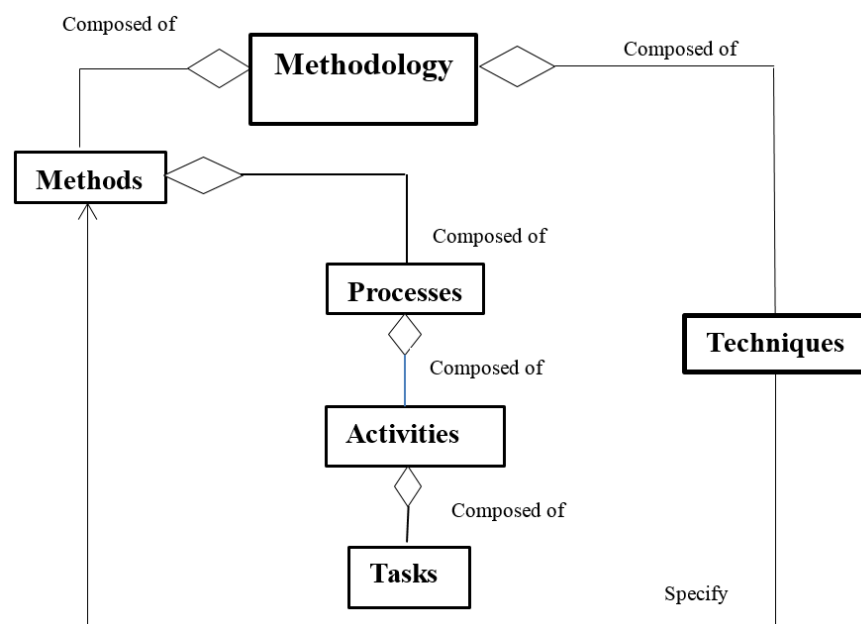


Figure 3.1 Graphical representations of terminological relationships in methodologies (Gomez-Perez, Fernandez-Lopez and Corcho 2004, 109)

3.4.2. Ontology development process

This process involves the tasks that must be accomplished in the process of constructing ontologies, although the order in which these tasks should be performed is not specified in the process (Gomez-Perez, Fernandez-Lopez and Corcho 2004, 109). (Fernández-López, Gómez-Pérez and Juristo 1997b) .

There are three main activities in the ontology development process that should be identified are those presented below (Gomez-Perez, Fernandez-Lopez and Corcho 2004; Pinto and João 2004):

- Ontology management activities which include: scheduling, control and quality assurance.
- Ontology development-oriented activities which involve pre-development, development and post-development activities.
Pre-development activities include studies of the environment and feasibility.
Then, development activities include specification, conceptualization, formalization, and implementation.
- Ontology support activities include knowledge acquisition, evaluation, integration, documentation, merging, configuration management and alignment.

3.4.3. Ontology lifecycle

Practitioners carry out a sequence of activities during the construction of ontology and the process is known as the ontology lifecycle. Unlike the ontology development process, the ontology lifecycle specifies when and what activities should be carried out at each stage and in what order; moreover, it describes the various stages of the ontology's lifecycle and how these stages are related to one another (Gomez-Perez, Fernandez-Lopez and Corcho 2004, 111; Fernández-López and Gómez-Pérez 2002, 149).

In conclusion, the ontology development process becomes an engineering activity rather than an artefact. This process identifies which activities and not the order in which activities should be performed. Whereas ontology lifecycle identifies when activities should be carried out, what are the stages for each activity and how they related.

3.4.4. Appropriate methodologies for ontology building

According to de Almeida Falbo (2004), Gruninger and Lee (2002), and Katsumi and Gruninger (2010) the construction of an ontology is neither an easy nor simple process. As already discussed, it requires methods, tools and guidelines to perform various activities. Building ontologies is motivated by sharing and reusing knowledge bases if users share the same assumptions as the original designers. So it is necessary to secure ontological commitments from stakeholders to reuse and share systems knowledge. Otherwise, outcomes remain limited (Gruninger and Lee 2002).

Corcho, Fernandez-Lopez, and Gomez-perez (2003) concluded that, compared with the developments in software engineering and knowledge engineering methodologies, there was a lagging behind in terms of developing a comprehensive and adequate methodology for ontology construction.

Fernández-López (1999) claimed at the time that at that there were no fully-fledged methodologies available.

Spyns, Tang, and Meersman (2008) believed that there were no comprehensive engineering methodologies available for the construction of ontologies.

Uschold and Gruninger (1996) stated that no standardised methodologies have been developed to date for the building of ontologies. Their solution was to suggest a methodological approach guided by theoretical and methodological principles with a scientific basis.

There are numerous methodologies and methods developed for ontology lifecycles in the literature. Those summarized below take into account the literature that has been most discussed and debated.

3.4.4.1. Cyc project

This method was developed by (Lenat and Guha 1990). They developed a Cyc knowledge-based project to support the acquisition of knowledge. This project includes three phases:

Phase 1: Manual extraction of common sense knowledge;

Phase 2: Computer aided extraction of common sense knowledge;

Phase 3: Computer managed extraction of common sense knowledge.

3.4.4.2. Gruninger and Fox's Methodology

Grüninger and Fox (1995) proposed this methodology in 1995, based on their experience with the TOronto Virtual Enterprise project (TOVE) at the University of Toronto. This methodology process has six steps: motivating scenario; informal competency questions; first order logic: terminology; formal competency questions, first order logic: Axioms; and completeness theorems (Silva, Souza and Almeida 2012, 6-7; Casellas 2011, 58-59; Changrui and Yan 2012, 351-352; Gomez-Perez, Fernandez-Lopez and Corcho 2004, 119-123; Corcho, Fernandez-Lopez and Gomez-perez 2003, 45; Fernández-López and Gómez-Pérez 2002, 134-136):

3.4.4.3. Uschold and King Methodology

Uschold and King (1995) proposed a skeletal methodology for building ontologies. Then, it was extended by (Uschold and Gruninger 1996). They proposed a set of guidelines for ontology construction and merging. It is based on the experience of developing the Enterprise Ontology, an ontology for enterprise modelling processes and includes four stages: identify purpose and scope of the ontology; build the ontology; evaluate; and document.

Uschold and Gruninger (1996); (Uschold 1996) proposed three strategies for identifying the main concepts in the ontology, which include: top-down approach, bottom-up approach, and middle-out approach. Uschold (1996) concludes that there are several important guidelines when identifying terms and creating definitions to organise the structure to the ontology for which the general are: clarity, consistency, coherence, extensibility and reusability.

3.4.4.4. The KACTUS methodology

In 1996, Bernaras, Laresgoiti, and Corera (1996) proposed the KACTUS approach within the Esprit KACTUS project. This approach was applied in an electricity transport network domain. There are three steps in the process of developing an application. There are no specific tools available to support this methodology (Bernaras, Laresgoiti and Corera 1996, 299).

3.4.4.5. Common KADS methodology

CommonKADS is the leading methodology used to support Knowledge Basis System (KBS) engineering. This methodology has been developed over the past decade, and it is currently in use worldwide by companies and educational institutions. The aim of this methodology is to structure a development approach as is necessary in knowledge-based systems (Guus Schreiber et al. 1994, 28). The CommonKADS method is designed to develop legal knowledge systems (LKS) and not specifically for the design of ontology.

3.4.4.6. METHONTOLOGY methodology

This methodology was developed by the Polytechnic University of Madrid between 1996 and 1997 by (Gómez-Pérez, Fernández and Vicente 1996; Fernández-López, Gómez-Pérez and Juristo 1997b). It has been extensively described by (Fernández-López 1999; Fernández-López and Gómez-Pérez 2002; Gomez-Perez, Fernandez-Lopez and Corcho 2004). This methodology was developed taking the IEEE Standard 1074 1995 for Developing a Software Project Life Cycle Process as a starting point (Fernández-López 1999). The development process and life cycle of Methontology includes three kinds of activities: Management activities; Development activities; and Support activities.

3.4.4.7. Noy and McGuinness methodology (Ontology Development 101)

This methodology was developed for the ontology of wines and food as a guide with seven steps and a group of rules and suggestions. To present their ontology, Noy and McGuinness (2001, 23) used Protégé as a tool. According to this methodology, there are seven steps as summarised in Figure 3.9. Developers should also check whether existing ontologies can be reused.

3.4.4.8. SENSUS-based methodology

This methodology is described in (Swartout et al. 1996). It is a natural-language-based ontology developed by the Natural Language group at the Information Sciences Institute (ISI) to provide a broad conceptual structure for working in machine translation (Swartout et al. 1996, quoted in Knight and Luke 1994). SENSUS methodology developed ontology works by extracting and merging information from existing electronic resources (Swartout et al. 1996) and has more than 70,000 concepts organized in a hierarchy, according to their level of abstraction.

3.4.4.9. On-To-Knowledge Methodology (OTKM)

The On-To-Knowledge methodology (OTKM) for introducing and maintaining ontology-based Knowledge Management (KM) systems has been presented by several contributors. It distinguishes between Knowledge Process that supports its maintenance and Knowledge Meta Process supporting the setting up of ontology-based applications (Sure, Staab and Studer 2004; Sure and Studer 2002; Staab et al. 2001a). There are five main phases in the Knowledge Meta Process that lead to ontology-based Knowledge Management applications as shown in Figure 3.11.

Noy and McGuinness (2001, 23) pointed out that “there is no single correct ontology for any domain” and design ontology is a “creative process and no two ontologies designed by different people would be the same”.

Soares (2009, 82-84)) presented a summary of thirty methodologies that study or use other methodologies, and he found that the one developed by Gruninger and Fox is the second most popular approach, followed by the Noy & McGuinness, the Methontology, the Uschold & King, and the On-To-Knowledge methodologies.

In summary, it can be seen that there are various methodologies to build ontology. The above are the most well-known methodologies.

3.4.5. Comparing ontology building methodologies

There are several researches in the literature comparing methodologies for the ontology development processes. This comparison is based on what is presented by the following authors: (Fernández-López and Gómez-Pérez 2002; Corcho, Fernandez-Lopez and Gomez-perez 2003; Casellas 2011; Silva, Souza and Almeida 2012; Gomez-Perez, Fernandez-Lopez and Corcho 2004). Table 3.1 provides a summary of the ontology development process for nine methodologies. There are three values used in this table which are ‘NP’ meaning not proposed by public documentation. ‘Proposed’ means that this process is identified by the methodology. ‘Described’ implies the ‘how’, ‘when’ and ‘who’ in relation to each task in the proposed activity for each methodology.

It can be identified from the literature, namely Fernández-López and Gómez-Pérez (2002, 152-154) that:

1. The description for the phases for building Cyc is generally stated, and there are no explicit proposals with respect to an evolving prototype’s lifecycle.

2. Uschold and King's (1995) methodology (Enterprise ontology) lacks the lifecycle proposal for building an ontology. It is less detailed than Gruninger & Fox's (1995) methodology and it is applied only to business situations.
3. The Gruninger & Fox methodology (TOVE project ontology) again lacks a lifecycle proposal model. Therefore, this methodology does not ensure the evolution of prototypes or a lifecycle model. It is also only applied to business. However, the strength of this methodology is its high degree of formality.
4. Bernaras A. et al.'s (1996) approach does not explicitly state whether prototypes evolve through the Esprit KACTUS project, although they appear to assume it does. In addition, it has the same omissions as the first three. Moreover, it is limited to particular domain ontologies and applications.
5. An evolving prototype life cycle is proposed clearly in METHONTOLOGY, so it is arguably the most mature methodological approach.
6. SENSUS methodology does not describe how to develop versions other than the initial one. In addition, it does not refer to a lifecycle. Moreover, it has the shortcomings of the above methodologies.
7. All the methodologies except for METHONTOLOGY are lacking details in their description of activities and techniques.

Silva, Souza, and Almeida (2012, 12) listed some other considerations:

1. Cyc, KACTUS, and SENSUS methods do not clarify in detail the activities and procedures for ontology building.
2. The Cyc method and 101 methodology emphasized development activities, in particular the implementation activity. On the other hand, they ignore project management, feasibility studies, and maintenance and evaluation of ontologies in some important aspects.
3. The theoretical principles that are followed in the classification and concept theories when specifying their elements are not explained clearly.

According to De Nicola, Missikoff, and Navigli (2005, 9-10), Gruninger and Fox (1995) provide a skeletal methodology for ontology building. Uschold and King (1995) presented a methodology based on competency questions. METHONTOLOGY on the other hand is a complete ontology development process as proposed by Fernandez, Gomez-Perez and Juristo (1997). It also provided descriptions for the development process and ontology support activities. The ontology life cycle is based on evolving prototypes and specific techniques for each activity. The methodology with a strong emphasis on knowledge maintenance and management is the On-To-Knowledge methodology.

Casellas (2011, 106) criticizes the 101 method in stating that a list of terms is required and there is no indication regarding how this list is to be acquired.

(Pinto and João 2004, 451-453) present their arguments and state that:

1. The methodologies TOVE developed by Gruninger and Fox (1995), and Enterprise developed by Uschold and King (1995), are the first generation types for building ontology, so both of them are lacking with respect to the maintenance activities.
2. METHONTOLOGY is the second generation type, and it was applied to a different domain and updated accordingly, so, it identifies more activities than others.
3. Different terminology is used by the methodologies. For example, the term “identification of purpose” is used in the Enterprise methodology instead of “specification” in others.
4. There is no consideration of stages in some methodologies. For example, in TOVE, there is no separation between formalization and implementation. In Enterprise, the “capture” activity consists of conceptualization and knowledge acquisition activities.
5. There are sub-divisions of activities within the same stage in some methodologies. For example, TOVE subdivides the conceptualization, formalization, implementation into numerous divisions.
6. Different timings are proposed by different methodologies. Some assume that activities should be performed during the whole ontology building lifecycle. Whereas, others assume that some activity should be performed at a specific stage. For example, METHONTOLOGY proposes that knowledge acquisition should be performed during conceptualization rather than in other stages, compared to Enterprise, which requires that knowledge acquisition be performed at a specific stage.
7. Some methodologies enable the building of formal and/or informal ontologies. For example, Enterprise allows formal and informal ontologies to be built, while TOVE and METHONTOLOGY allow formal ontologies only.
8. The main problem of TOVE is that it fails to provide guidance on how the activities should be performed. In addition, it is vague and difficult to use for those domain experts with no knowledge representation experience or engineering skills, because it uses First-Order Logic (FOL) as the knowledge representation language.
9. Enterprise provides guidance to what and how to present the domain. In addition, acquiring knowledge and building a conceptual model are separated. Moreover, it provides a way in which knowledge should be formally presented and implemented.

10. METHONTOLOGY is a methodology that provides more guidance for the inexperienced developer, because all the activities are defined and the guidelines are clear and concise at each stage.

Having regard to the critical issues raised above and the contents of Table 3.1, the following outcome statements are warranted. All methodologies have their issues, as discussed; however, each ontology method has been applied with some success in given situations, despite these issues. Having regard to their individual strengths and weaknesses, it becomes apparent that two methods, namely METHONTOLOGY and On-To-Knowledge stand out as the most appropriate.

In summary, METHONTOLOGY is a unique methodology that is proposed for ontology management activities. Also, On-To-Knowledge is the best methodology for describing ontology management activities.

For ontology-development-oriented activities, in the pre-development processes, On-To-Knowledge is the only methodology that proposes that the environment study be undertaken in this research. CommonKADS is the only methodology that proposes a feasibility study and On-To-Knowledge is the only methodology that describes the feasibility study. Within development processes, the Cyc is the only method that does not propose the specification activity. Gruninger & Fox, METHONTOLOGY, and On-To-Knowledge are the methodologies that describe in detail the specification activity, whereas, this activity is proposed by other methodologies. For conceptualization activity, there are three methodologies missing this activity: Cyc, Uschold and King, and SENSUS. It is proposed by KATUS, CommonKADS, and On-To-Knowledge. In addition, the others are described in detail. For formalization activity, the Cyc, Uschold and King, and SENSUS do not propose this activity. The methodologies that are proposed are: CommonKADS, Noy and McGuinness. The KATUS, METHONTOLOGY, and On-To-Knowledge describe this activity. Gruninger & Fox methodology is the only one that describes this activity in detail. For the implementation activity, METHONTOLOGY is the only that describes it in detail, whereas Gruninger & Fox, SENSUS, and On-To-Knowledge describe this activity. The other methodologies propose this activity. For post-development processes, the maintenance activity is proposed by the CommonKADS, METHONTOLOGY, and On-To-Knowledge methodologies and others are missing. The On-To-Knowledge methodology is the only one that proposes the use activity.

For ontology support activities, METHONTOLOGY is the only methodology that describes the knowledge acquisition activity in detail. Besides this, the On-To-Knowledge is the only methodology that describes this activity. In three methodologies it is not even proposed: KATUS, Noy and Mc Guinness, and SENSUS methodologies, whereas the other methodologies propose this activity. For the evaluation activity, METHONTOLOGY and the Gruninger & Fox methodologies describe this activity in detail. Uschold and King and On-To-Knowledge methodologies include this activity, whereas the others are missing this activity. For the integration activity, there are only two methodologies that do not propose this activity: CommonKADS, and SENSUS. All the others propose it. For Configuration management, METHONTOLOGY methodology is the only one that describes this activity. On-To-Knowledge is the only methodology that proposes it, and the others omit this activity. For the documentation activity, METHONTOLOGY is the only one that describes it in detail, and On-To-Knowledge describes it. The Cyc, Gruninger & Fox, Uschold and King, CommonKADS, Noy and McGuinness methodologies include this activity and the others omit it. All the methodologies omit the merging and alignment activity.

In conclusion, this research uses a combination of the methodologies from (Uschold and Gruninger 1996), (Fernández-López, Gómez-Pérez and Juristo 1997b) (Lopez et al. 1999) and (Noy and McGuinness 2001). For Uschold and Gruninger methodology, the purpose and scope are identified. For the METHONTOLOGY methodology, three activities -specification, conceptualization, and implementation- are described in detail, whereas the formalization is a description of activities. For the Noy and McGuinness methodology, the only activities that are described in detail are conceptualization and implementation.

Table 3.1 Summary of the ontology development process for nine methodologies

Feature			Cyc	Gruninger & Fox	Uschold & King	KACTUS	Common KADS	METHONTOLOGY	Noy & Mc-Guinness	SENSUS	On-To-Knowledge
Ontology management activities	Scheduling		NP	NP	NP	NP	NP	Proposed	NP	NP	Described
	Control		NP	NP	NP	NP	NP	Proposed	NP	NP	Described
	Quality assurance		NP	NP	NP	NP	NP	Proposed	NP	NP	Described
Ontology development oriented activities	Pre-development processes	Environment study	NP	NP	NP	NP	NP	NP	NP	NP	Proposed
		Feasibility study	NP	NP	NP	NP	Proposed	NP	NP	NP	Described
	Development processes	Specification	NP	Described in detail	Proposed	Proposed	Proposed	Described in detail	Proposed	Proposed	Described in detail
		Conceptualization	NP	Described in detail	NP	Proposed	Proposed	Described in detail	Described in detail	NP	Proposed
		Formalization	NP	Described in detail	NP	Described	Proposed	Described	Proposed	NP	Described
		Implementation	Proposed	Described	Proposed	Proposed	Proposed	Described in detail	Proposed	Described	Described

Feature			Cyc	Gruninger & Fox	Uschold & King	KACTUS	Common KADS	METHONT-OLOGY	Noy & Mc-Guinness	SENSUS	On-To-Knowledge
	Post-development processes	Maintenance	NP	NP	NP	NP	Proposed	Proposed	NP	NP	Proposed
		Use	NP	NP	NP	NP	NP	NP	NP	NP	Proposed
Ontology Support activities	Knowledge acquisition		Proposed	Proposed	Proposed	NP	Proposed	Described in detail	NP	NP	Described
	Evaluation		NP	Described in detail	Proposed	NP	NP	Described in detail	NP	NP	Proposed
	Integration		Proposed	Proposed	Proposed	Proposed	NP	Proposed	Proposed	NP	Proposed
	Configuration management		NP	NP	NP	NP	NP	Described	NP	NP	Proposed
	Documentation		Proposed	Proposed	Proposed	NP	Proposed	Described in detail	Proposed	NP	Described
	Merging and Alignment		NP	NP	NP	NP	NP	NP	NP	NP	NP

Resource: (Gomez-Perez, Fernandez-Lopez and Corcho 2004, 151; Casellas 2011, 78-79; Silva, Souza and Almeida 2012, 10-11; Fernández-López and Gómez-Pérez 2002, 151; Corcho, Fernandez-Lopez and Gomez-perez 2003, 48; Fernández-López 1999, 13)

3.5. Components of ontology

Scholars agree that concepts, relations, instances and axioms are the main components or basic and typical elements of ontology. Because of different ontology languages, the exact specification of these elements may vary according to the underlying knowledge model (Weller 2010, 126; Gomez-Perez and Corcho 2002, 56). The following subsection will introduce the main components of ontology.

3.5.1. Classes

Concepts are also known as classes of objects. Classes have been defined as “abstract or concrete, elementary or composite, real or fictitious”; in short, a concept can refer to just about anything including speech, actions or activities, strategies or plans, or cognitive processes, to name a few (Gomez-Perez and Corcho 2002, 55).

In addition, Weller (2010) stated that concepts can represent both tangible and intangible objects and can be expressed using nouns or both simple or complex phrases modified by adjectives and adverbs of degree to indicate whether they are very general or very specific. Furthermore, real ontologies may work with more than three abstraction levels for the concepts of basic objects. These three abstraction levels are: basic objects categories, superordinate objects categories, and subordinate objects categories (Rosch et al. 1976). Besides, classes are also known as taxonomies because they are organized into superclass-subclass hierarchies. Subclass is more specific than the superclass (Weller 2010; Horridge 2011).

3.5.2. Relations

Relations represent a “type of association between concepts of the domain” (Corcho, Fernandez-Lopez and Gomez-Perez 2007, 46). Binary relationships refer to the relational links involving two concepts; roles describe binary relations between concepts; inverse relationships refer to binary relation links between two concepts in the opposite direction. There are three types of relationships: association relationship, inheritance relationship, and composition relationship as presented in Chapter 4.

3.5.3. Properties

Properties are also known as slots or roles or attributes of classes. Properties represent relationships that describe various features and attributes of the concept (Noy and McGuinness 2001). Object properties and datatype properties are two main types of properties. Object properties are relationships between two individuals and they use “vocabulary” and “semantic” to describe this relationship. (Corcho et al. 2005) used “Attributes” to describe “data properties”. They distinguish between “instance attributes” and “class attributes”.

Instance attributes are concept instances expressed in terms of values. Class attributes describe concepts without using values. Class attributes are not inherited by the subclasses or by the instances (Corcho et al. 2005).

3.5.4. Instances

Instances are also known as individuals. Instances represent “real-world individuals” or are used to represent elements or individuals in ontology (Corcho et al. 2005, 145). Horridge (2011) stated that individuals, are also known as instances or “objects” in the interested domain. Individuals can be defined as being “instances of classes”.

3.5.5. Axioms

Axioms refer to constraints used on values for classes or instances; the properties of relations are types of axioms and they include more general rules (Noy and McGuinness 2001; Stevens, Goble and Bechhofer 2000).

3.6. Ontology research in Accounting Domain

There are several studies that developed ontologies from different perspectives of accounting (Guan, Levitan and Kuhn Jr 2013). Lukka (1990) analysed the ontological nature of the concept of profit in accounting based on ontology as a branch of philosophy in terms of realistic and idealistic ontology from the Western perspective. It was argued that there is little explicit discussion on the ontological aspects of accounting. However, it is an area of growing interest going by the critical accounting researches that have emerged. It was concluded that there is consensus that the profit concept is in favour of idealistic ontology.

Zhu et al. (2015) asserted that ontology research is “an emerging and multidisciplinary field”. In their study, they analyse global ontology research development from literature published from 1900 to 2012 collected from the Web of Science database in terms of authors, institutions, nations, and articles and they found that there are three stages in ontology research: the enlightenment stage (1909-1990), the growth stage (1992-2000), and the soaring stage (2001-2012). They observed that the contribution and collaboration of authors, countries, and institutes that were involved in this field clearly have been increasing in the last ten years.

Similarly, in accounting: very few ontological researches existed in the accounting domain; few scholars or institutions were involved in ontology research; lack of interest among accounting researchers seems “anomalous”; and there was an absence of empirical testing of theories or propositions based on theories (Weber 2002). Weber 2002, in his survey of work in ontology and accounting from 1982 to 2002 and found that: firstly, the importance of ontology for future generations of accounting systems and the richness and robustness that are produced by combining research on ontology with accounting are realized by very few accounting researchers. Secondly, the research in accounting and ontology is likely to be difficult and the problems that have existed in ontology may negatively impact on the development of accounting in this area. Thirdly, in order to predict the strengths and weaknesses and to direct the empirical tests of the methodologies and systems, a good theory is needed to guide usefully accounting practitioners.

Guan, Levitan, and Kuhn Jr (2013), in their article suggested that some areas of ontology research in CS/IS and Accounting Information Systems (AISs) are have been overlooked, and the gap between CS/IS ontology research and AIS ontology research in order to accelerate ontology research in AIS needs to be bridged. They refer to the fact that ontology research in CS/IS and AIS are in the field of design science research, but ontology research has “flourished” in CS and IS and “less extensive” research interest and work is shown in AIS research. Moreover, very few of the outcomes of current CS/SI ontology research have been incorporated into AIS research.

Aparaschivei (2007) emphasized the importance of an accounting ontology. Accounting information is the foundation for almost every decision that a company’s manager takes. Accounting knowledge is also a concern for developers of knowledge management systems and accounting intelligent systems. Aparaschivei recognized and ascertained that the accounting ontology process must be dynamic and it is necessary to build it to create an organizational accounting repository and bringing other benefits to the organization and the ontology field as well.

Most of the ontology research areas identified in AIS are: enterprise modelling; financial reporting and financial knowledge management. In addition, there are five types of theories in IS research: analysis, explanation, prediction, explanation and prediction, and design and action. Integrating these IS theories with AIS ontology research will enrich and increase AIS research as AIS is a sub-discipline of accounting, and the IS and accounting domain are the parents (Poston and Grabski 2000).

Guan, Levitan, and Kuhn Jr (2013) posited that the Resource-Event-Agent ontology (REA) is the best known stream of ontology research in AIS. REA is based on the accounting events theory (Guan, Levitan and Kuhn Jr 2013). McCarthy (1982) proposed the REA Accounting Model as a general model of “the stock-flow aspects of accounting object systems”. Although McCarthy did not refer to ontology in this paper, Geerts and McCarthy (2002) extend REA as domain ontology by developing formalization of REA influenced by research in IS in the late 1990s. Then, McCarthy and Geerts expanded their work to REA enterprise ontology or REA-EO. This model analysed, formally from the ontological perspective, relied on conceptual terminology of John Sowa, and analysed the economic primitives of the original REA model. Gailly, Laurier, and Poels (2008) proposed a new REA specification using a UML profile for ontology representation and they introduced several important methodologies and technologies into AIS including ontological engineering and OWL. This work is the best example of incorporating CS/IS with accounting domain. Poels et al. (2011) presented a laboratory experiment that measured the user’s understanding of diagrammatic conceptual schemas developed using the REA model based on cognitive theories. However, the REA framework focuses on economic events and financial resources (Church and Smith 2007).

Arndt et al. (2006) proposed a reference architecture -Financial Reporting Taxonomies Architecture- (FRTA) for sustainability reports which is based on the eXtensible Business Reporting Language (XBRL) according to GRI G3. The authors conclude that: it is a proper information and communication technology standard in terms of automatization and efficiencies; it is a standardization of a sustainability report; it is a mean to reduce the cost when exchange among organizations; and it becomes semi-automated sustainability reporting.

Edson, Daniela, and Paulo (2015) proposed a conceptual model for the adoption of a Service-Oriented Architecture (SOA) approach for disclosure of sustainability reports integrated with XBRL taxonomy based on GRI G3 to create internationalization and standardization of information. However, the above two researches used XBRL language which is an XML-based mark-up language used for the electronic exchange of business and financial data.

Spies (2010) present logical analysis principles for reporting metadata taxonomies; propose representation of the generally accepted accounting based on the general accepted accounting principles taxonomies in XBRL by ontology provided in the web ontology language (OWL). However, it is an ontology for generally-accepted accounting principles.

Debreceeny and Gray (2001) presented eXtensible Markup Language (XML) as a technique to tag accounting and financial data in order to improve the automation of information location, retrieval, and reporting. It provides a high degree of accuracy and reliability and other benefits including database accounting and formal ontologies.

Spies (2010) used UML to propose a representation of XBRL using a meta-modeling approach. His research is significant for two reasons: firstly, a meta modelling approach to construct ontologies from XBRL taxonomies is proposed. Secondly, the feasibility of this approach with UML is confirmed (Guan, Levitan and Kuhn Jr 2013). Another research by Lara, Cantador, and Castells (2006) presented an XBRL taxonomy for investment funds and translation process into OWL ontologies and its benefits.

Chou, Vassar, and Lin (2008) developed an ontology concept model for profit and loss accounting and implemented using software. The purpose of this research was to share a common understanding of accounting theory for profit and loss accounts among people and software agents using Microsoft's NET software. The approach of this article is (Net technique) which is a semi-structured element in the domain knowledge of accounting.

Teller (2008) built ontology of accounting notions to represent the whole knowledge of the domain based on International Financial Reporting Standards (IFRS). The formal representation of accounting standards was built into two parts, syntactic and semantic. The syntactic part involves the framework of the standards and the semantic part focuses on the meaning of each element in the standards. He used Protégé software from Stanford University and OWL language to store the ontology.

Chou and Chi (2010) proposed an ontological model Event, Principle and Account (EPA) for accounting principles by means of which accounting knowledge can be represented, stored and reused. They used 'reconstructed method' to design an EPA model; Web Ontology Language-Description Logic (OWL-DL) to present EPA model. They validated their study by using Protégé platform to find instances of classes by creating Competency Questions. The authors claim that this study can be adapted to complement more comprehensive bases for accounting knowledge.

Fisher (2007) presented a prototype system to support the temporal reconstruction of financial accounting standards (FASs). The dynamic and continuing codification of FAS of this prototype was built.

Livieri, Zappatore, and Bochicchio (2014) proposed a modification of and extension to the existing XBRL ontology to OWL to semantically model and link financial statements with management accounting information that produces a Key Performance Indicator Ontology (KPIO). It is more compatible with OWL and more suitable for inferencing new knowledge about financial statements starting from information about management accounting.

Weigand and Elsas (2012b) introduced a model-based auditing approach as a design artefact that includes a corresponding business modelling language. They integrate REA model-based auditing, together with auditing techniques into a Service-Oriented Auditing (SOAu) framework. The interpretation of REA and extensions in this research are research contributions to the knowledge base of accounting information systems. They conclude that REA meets the requirements of model-based auditing because the information system is based on the REA model.

Smeureanu et al. (2011) developed ontology for Corporate Social responsibility based on the guidelines proposed by the 'ISO 26000 Standard for Social Responsibility'. A neural network module was developed by the authors based on machine-interpretable ontology to classify companies based on their social responsibility. The methodology proposed called the POS is a tagging process using an intelligent agents' "evaluations and previous experiences" approach and web crawling as a means of collecting data from around 100 companies for several large British companies.

Weigand and Elsas (2012a) evaluated to what extent the REA business ontology developed by (McCarthy 1982; Geerts and McCarthy 2006) can be used to develop Environmental Management Accounting (EMA) models and tools, REA business ontology to build Material Flow Cost Accounting (MFCA) models is introduced, the extended REA ontology is evaluated, models to support integrated E(M)A assurance are developed, a straw-man for an ICT-based tool environment is designed, focusing on physical resource flow modelling (internal and external) because resource cycle analysis is central to current environmental management approaches such as MFCA. Therefore, they integrate physical flows and economic flows. There is no reference to social dimension.

Iswandi, Suwardi, and Maulidevi (2014) describe the design of their accounting transaction ontology. It involves accounting knowledge that will be used in accounting intelligence systems. This research is a starting point toward automation in accounting records. However, it is in its infancy and is simplified.

Weigand, Johannesson, and Bergholtz (2015) introduced a service accounting model based on a formal ontology approach and proposed several adaptations to the REA model. The proposed framework is the first work in service science to evaluate small online gaming. So, it is service accounting integrated with business ontology REA.

Upward and Jones (2015) presented a framework of formal ontology to model Successful Strongly Sustainable Business Model Ontology (SSBMO) based on scientific and grounded theoretical principles. It basically depends on the business model ontology (BMO) that was developed by Osterwalder and Pigneur based on the model for business ontology of (Osterwalder, 2004 quoted in Upward and Jones 2015). BMO has become a widespread reference and the social proof of the derived business model canvas (BMC) that focuses on “creating profit for the enterprise”. Then they extended the BMC to include sustainability requirements (creating positive environmental, social, and economic value). This research is the first step to improve the ontology of the business model on a continuum from profit-normative to strongly sustainable business to benefit not inside the field of business but outside the business to include public policy analysts, educator, governments, NGOs...etc. However, this research has not been critically assessed in the management literature; nor has there been an assessment of its applicability.

Hegazy, Sakre, and Khater (2015) presented ontology for financial accounting information in the Arabic language in the computer technology domain. Horridge (2009) and Noy McGuinness (2000)'s ontology engineering methodology was used to create a conceptual framework for assets, liabilities, revenues, and expenses accounts. The developed ontology is implemented using OWL language and Protégé tool-4.3 displaying Arabic script to construct an ontology-based financial auditing system and ontology-based annotation system. However, this research has not been evaluated or formalised and the authors acknowledge that it is still in the preliminary stage. However, is the fact that it is ontology for financial accounting in the Arabic language makes it new contribution to the literature.

Gerber, Gerber, and Merwe (2015) developed a conceptual framework for financial reporting (CFfFR) as a guide to users and preparers of financial reports and standards. They developed: a hierarchical model of the financial reporting domain through defining role, purpose, usage and content of the CFfFR and the competency questions are created; decision process model through creating six filters in sequential order and the model was informally validated and refined using accounting domain experts, and the latest model enables the identification of concepts and relations of CFfFR, and then the first version ontology of CFfFR was constructed. This ontology is: a basis for interpretation and development of accounting standards for financial reporting; a standard formal representation of the knowledge in the CFfFR; clarify misunderstanding about the concepts in the literature; and resolve some issues in the existing framework initiatives in order to share uniform understanding, interpretation and application of the CFfFR. The scope of this research is CFfFR and the role is Financial Reporting Domain. Therefore, it focuses only on financial reporting according to a conceptual framework for financial reporting: International Accounting Standards Board (IASB) or Financial Accounting Standards Board (FASB).

Schwaiger (2015) modified the REA business ontology to produce the REA-based ALE accounting ontology whereby the equality of assets (A), liabilities (L), equity (E), to which the REA-based ALE refers, includes elements of double-entry bookkeeping (ignored by McCarthy), accounting transactions, debits and credits events with respect to assets, liabilities and equity as well as value restrictions. The authors claim that this research is a “fusion” of the accounting and the finance domains. Again it focuses on the financial side of business.

From literature review showed that there was no ontology for Sustainability Reporting according to the GRI G4. Therefore, this research is intended to fill the gap by developing ontology for Sustainability Reports based on GRI G4.

3.7. Chapter Summary

Ontology is defined from different perspectives; however, the generally-accepted, comprehensive definition is accepted for this research. The purposes of ontology are to enable sharing and reuse. The methodologies to build ontologies from scratch are reviewed and compared. The elements of ontology are defined. Finally, the literature on ontology research in accounting was examined to determine the extent to which ontology research contributed to the accounting domain and the knowledge gap that this research will address.

Chapter 4. An overview of the solution

4.1. Introduction

As previously explained, the GRI Sustainability Reporting is a process, the inputs of which are principles and guidance, and the outputs of which are Standard Disclosures. In this chapter, Sustainability Report ontology will be proposed to solve the issues identified in Chapter 3. In order to develop this ontology, an ontology development lifecycle based on GRI G4 is proposed and described in Section 4.2. A high-level overview of the Sustainability Report ontology is elaborated in Section 4.3.

4.2. Using scenario of the ontology in the real world

The scenario is illustrated in Figure 4.1. In a real-world use scenario of Sustainability Reporting, small, medium or large enterprises engage in this reporting process by following Sustainability Reporting Guidelines. Because of a lack of a standard application for the report generation, ontology is used to solve this problem by generating an Ontological Model for Sustainability Reporting. This enables organizational sharing, communicating and reusing this Model for Sustainability Reporting. The components of ontology are elicited from Sustainability Report that based on GRI G4 and they involved in ontology development process and resulted ontological model. The Ontology Development Process Model includes four phases: specification, conceptualization, formalization, and implementation (Fernández-López, Gómez-Pérez and Juristo 1997a; Lopez et al. 1999; Noy and McGuinness 2001; Uschold and Gruninger 1996). Through these steps, the purpose and the scope of the ontology are defined, the conceptual model is identified and formalized, and the formalized model is encoded. Then, to verify and validate the model, an outcome of this process is to create and assess an ontological model for Sustainability Reporting based on GRI G4.

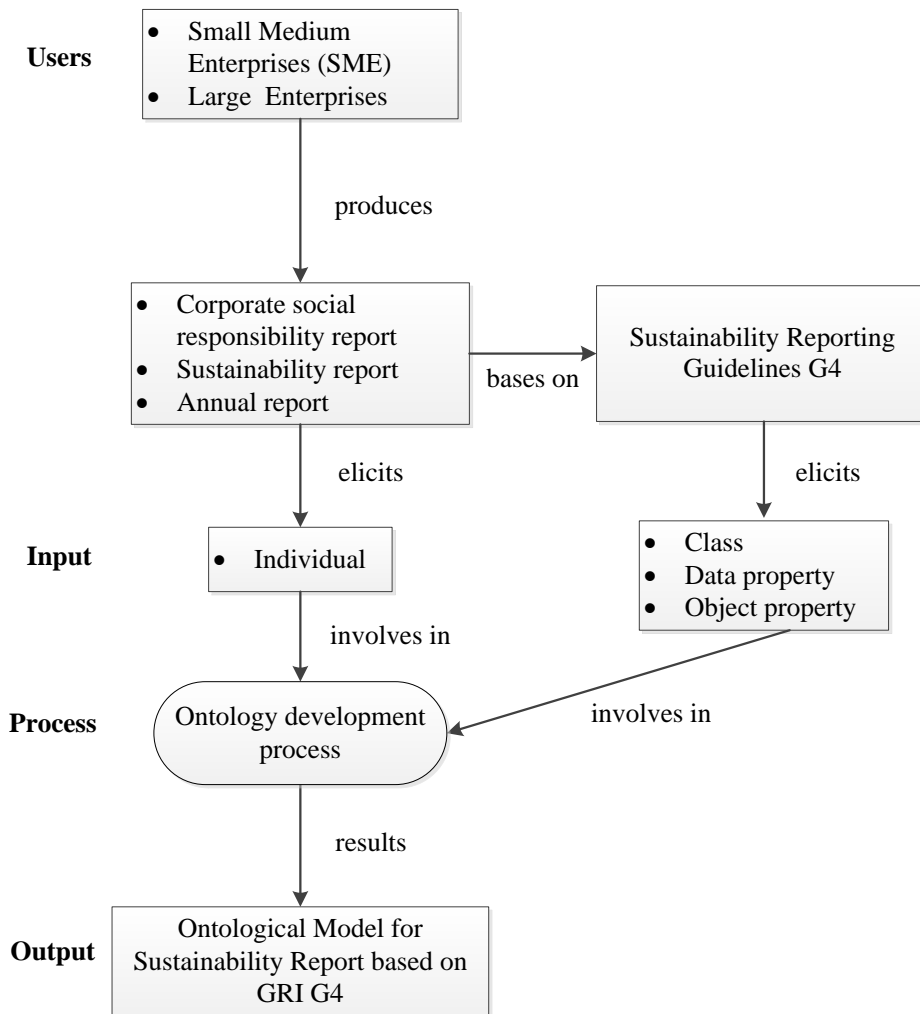


Figure 4.1 Conceptual framework

Figure 4.2 shows the contained tasks in each phase. In the specification phase, the motivation scenarios and competency questions need to be described. In the conceptualization phase, the conceptual models need to be defined. In the formalization phase, the conceptual models are required to be formalized. In the implementation phase, the ontology will be built by encoding (Uschold 1996; Fernández-López, Gómez-Pérez and Juristo 1997a; Lopez et al. 1999; Noy and McGuinness 2001; Staab et al. 2001b; Uschold and Gruninger 1996).

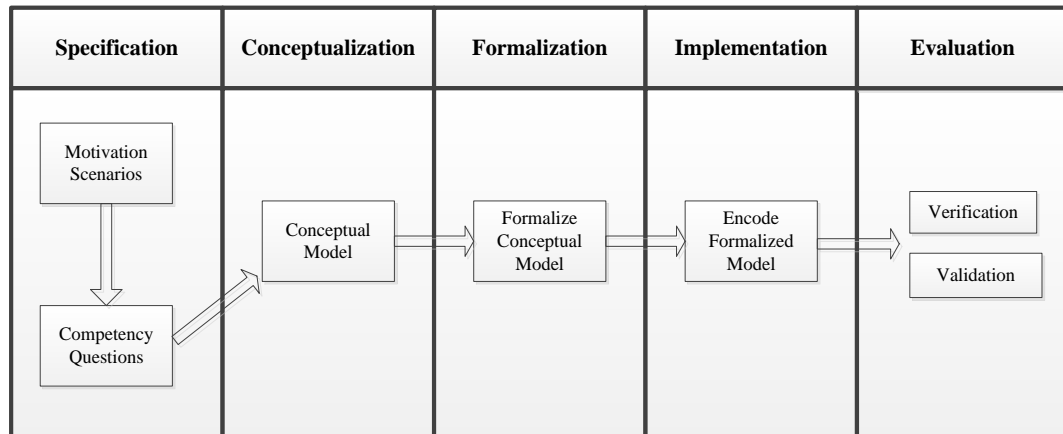


Figure 4.2 Tasks in each phase of the Sustainability Report ontology development

The following subsections will explain each phase.

4.2.1. Specification phase

The first development phase of ontology is the specification phase; this activity is ontology description (usually in natural language). The aim of this phase is to ‘state why the ontology is being built, what is intended uses are, who the users are, and which requirements the ontology should fulfil’ (Suárez-Figueroa, Gómez-Pérez and Villazón-Terrazas 2009). The first requirement is to describe the motivating scenario and present solutions to the problems arising in the scenario (Grüniger and Fox 1995) as stated above. (Uschold and Gruninger 1996; Uschold 1996) identify the purpose and scope of ontology. Fernández-López, Gómez-Pérez, and Juristo (1997b) and Lopez et al. (1999) show a brief example of ontology requirements specification document in the chemicals domain. The following information should be included in the specification phase. A detailed ontology requirements specification document (ORSO) is required in this phase as proposed by (Uschold 1996). The specifications of the Sustainability Reporting ontology are defined as follows:

- Domain: Sustainability Reporting based on GRI Guidelines G4.
- Purpose: Developing a Sustainability Reporting -ontology-based knowledge base for software to automatically create GRI reports for the following reasons:
 1. Enabling knowledge sharing among people, organizations, and software systems (Uschold and Gruninger 1996; Chandrasekaran, Josephson and Benjamins 1998; Gruninger and Lee 2002; Duineveld et al. 2000; Noy and McGuinness 2001).
 2. Reusing knowledge. The proposed ontology can be reused by organisations and can also be updated to adapt to new generations of GRI.

- End users: Engaged stakeholder groups, for example, civil society, customers, employees, other workers and their trade unions, local communities, shareholders and providers of capital, and suppliers.
- Level of formality of the implemented ontology: Semi-formal. This is the level of formality that will be used to codify the terms and their meanings in a language somewhere between natural language and a rigorous formal language (Fernández-López, Gómez-Pérez and Juristo 1997b). Uschold and Gruninger (1996) classify the level of formality into: highly informal, semi-informal, semi-formal or rigorously formal ontologies.
- Scope: All components of Sustainability reporting defined according to GRI Guidelines G4.
- Sources of knowledge:
 1. Interviews with the experts in GRI Sustainability Reporting Guidelines because the ontologists and the GRI reporters are different jobs. However, in this research the ontology is used as a tool to design Sustainability reporting according to GRI G4. So, the reporters are the professionals experienced in the content of GRI reporting and the ontologists will structure the information of GRI G4 into: classes, properties, relationships, axioms and individual. Then Protégé is used to implement this ontology development process.
 2. The following reports:
 - GRI Sustainability Reporting Guidelines G4: Reporting Principles and Standard Disclosures (Global Reporting Initiative 2013a).
 - GRI Sustainability Reporting Guidelines G4: Implementation Manual (Global Reporting Initiative 2013b).

The second requirement is to create ‘competency questions’ ‘CQ’ as the technique for establishing the ontology requirements (Grüninger and Fox 1995). CQs are queries written in natural language and the ontology to be built should be able to answer all questions raised by stakeholders and can be used to verify the correctness of the ontology with the ontology requirements identified (scope of the ontology) (Suárez-Figueroa, Gómez-Pérez and Villazón-Terrazas 2009). The main concepts and their properties, relations and formal axioms of the ontology are used to extract these questions and answers (Gomez-Perez, Fernandez-Lopez and Corcho 2004). In this research, 204 CQ are created for data instances found in four Australian companies to implement ontology as can be seen in chapter 8.

4.2.2. Conceptualizations phase

The second step in the ontology lifecycle is conceptualization. The output of the first phase will be transformed into a conceptual model by means of conceptualization (Corcho, Fernandez-Lopez and Gomez-Perez 2007). The aim of this activity is to structure the domain knowledge in a conceptual model in terms of the domain vocabulary identified in the ontology specification activity (Fernández-López, Gómez-Pérez and Juristo 1997b) . Weber (2003, 1), defines ‘Conceptual modelling’ as an ‘activity undertaken during information systems development to build a representation of selected semantics about some real-world domain’. According to (Noy and McGuinness 2001), the requirements for the conceptualization phase are:

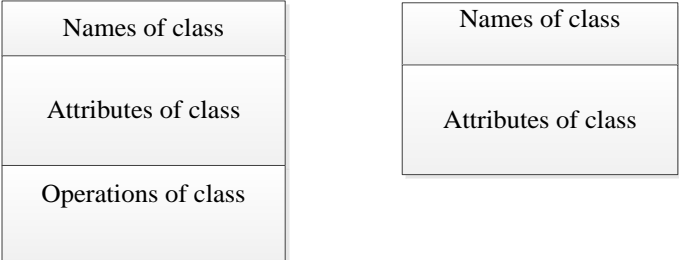
1. Identify terminologies in the GRI G4 Guidelines; and
2. Identify the classes, their properties, and the relationships between them as defined in GRI G4 Guidelines and create instances from actual sustainability report.

In this research, all classes, data properties, object properties identified for Sustainability Report according to GRI G4 can be found through chapters 4-8. All instances data can be found in Appendix B as identified from actual sustainability report for 4 Australian companies. Most definitions of classes can be found in (section 6 in Global Reporting Initiative 2013b).

4.2.3. Formalization phase

The formalization phase is the core of an ontology development process. It involves transforming a conceptual model into a formalized model or semi-computable model (Weller 2010; Corcho, Fernandez-Lopez and Gomez-Perez 2007; Corcho et al. 2005). Colomb (2007) explained that a formal ontology is an “advanced knowledge representation system”. Guebitz, Schnedl, and Khinast (2012, 8) stated that creating a neutral ontology formulation, independent of implementation languages is the goal of this phase. There are different levels of the transformative process in relation to the conceptual model ranging from semi-formal to rigorously formal. The greater the formality, the greater is the amount of automation required to support ontology (Uschold 1996). It depends on the implementation requirements of the ontology. Guebitz, Schnedl, and Khinast (2012) presented the object-oriented modelling language as an appropriate formalism to represent ontology by using the Unified Modelling Language (UML). Thus, for the development of the sustainability report ontology, the formalization requires a notation system to formalize the sustainability report ontology conceptual model.

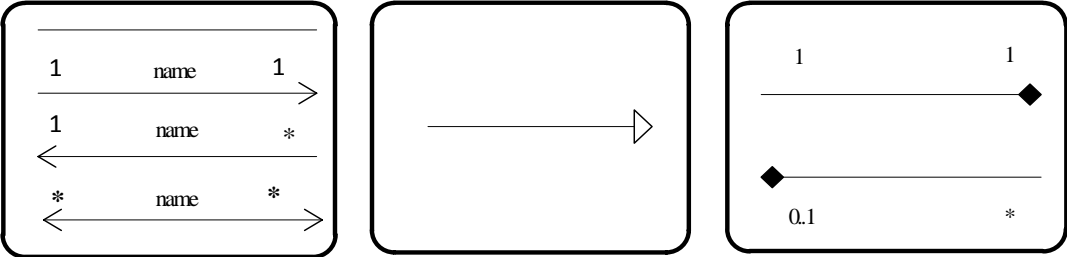
To create a formal ontology, all main structural components and their constraints must be explicitly described (Guebitz, Schnedl and Khinast 2012). The object oriented modelling language can be used for ontology modelling. Cranefield and Purvis (1999) suggested that UML as a static modelling notation can be used to model the “formal semantics” of ontologies. Gomez-Perez, Fernandez-Lopez, and Corcho (2004) and Paul et al. (2002) justified the use of this language in ontology construction for the following reasons: it enables people outside the Artificial Intelligence (AI) community to understand and use this language easily; a UML model is a standard graphical representation; and many tools are available to apply this language. The UML class diagram can be used to represent the classes in the domain within a model (Martin 1997; Schmuller 2002). In a UML class diagram, a rectangle represents a class. This rectangle contains three parts: the name of the class, the attributes of the class (name, type, and visibility of attributes), and the operations of the class, as shown in Figure 4.3 (a). Taking into account the characteristics of ontology, only classes and attributes of classes are required for modelling the sustainability report ontology. The class diagram for the development of ontologies is shown in Figure 4.3 (b).



(a) UML Class diagram (b) Class diagram for ontologies

Figure 4.3 UML Class Diagram for ontology modelling

In this research, three types of relationships are identified between classes, which are graphically represented in Figure 4.4.



(a) Association type of relationship (b) Inheritance type of relationship (c) Composition type of relationship

Figure 4.4 three types of relationship in UML

1. Association relationship is used when classes are connected together conceptually by visualizing the association as a line between classes with the name of the association above the line, indicating the direction of the line, multiplicity- the number of objects from one class that relate to a single object in an associated class, place them above the association line at the both ends of the line. In addition, a rule can be directing now by putting a constraint near the association line. A rule can be defined. Moreover, association relationship indicates in which way the name should be read as shown in Figure 4.4a.
2. Inheritance relationship means a subclass (child) can inherit attributes from a superclass (parent). The child class is more specific than the parent class. The 'is a' is the relationship between subclass and a superclass. The symbol for inheritance relationship in a UML diagram is a solid line from the subclass to the superclass with unfilled arrowhead as shown in Figure 4.4b. Inheritance cannot be used when the data properties for each class are different (Ambler 2004).
3. Composition relationship means one class contains a number of classes. The container class and the contained classes are in a part-whole association. There is a strong life cycle dependency between (contained) class and (container) class. That means if class A deleted, then class B is deleted. In other words the lifecycle of the part is managed by the whole. The symbol for this relationship in a UML diagram is a line with the diamond filled near the whole class as shown in Figure 4.4c.

4.2.4. Implementation phase

This activity builds computable models in a formal language or representation of conceptual models by using an ontology language (Corcho, Fernandez-Lopez and Gomez-Perez 2007). To implement computable models, there are tools used in different ontology languages as ontology editors. There are several languages: XML, RDF, OIL, DAML+OIL, OWL, CARIN, FLogic, Jess, and Prolog (Corcho et al. 2005). The requirements of the implementation phase are:

1. A formal language that can be used to encode the ontology; and
2. A tool that supports the ontology development activities.

In this research, Web Ontology Language OWL is used as a standard and broadly acceptable ontology language, which provides classes, data properties, object properties and individuals (Horridge 2011). Protégé Onto Edit (protégé.stanford.edu) is used as a tool to represent ontology in a machine readable format. Ontologies are stored as Semantic Web documents (W3C OWL Working Group, 2012). The implementation phase is explained in Chapter 8 in detail.

4.2.5. Evaluation phase

Evaluation is a ‘technical judgment of the content of the ontology with respect to a frame of which can be requirements specifications, competency questions or the real world during each phase and between phases of their lifecycle to guarantee to end users the consistency, completeness and conciseness of the ontologies definitions, documentations, and software’ (Gómez-Pérez 2004, 2001, 1996, 1995). The details of this phase are explained in chapter 8.

Ontology evaluation includes:

1. Ontology verification and
2. Ontology validation

In the next section, the concepts, data properties, relationships, and object properties for the high-level layers of the Sustainability Report ontology are defined in textual descriptions and represented in the UML class diagram.

4.3. A high-level overview of the Sustainability Report ontology

The GRI G4 Sustainability Reporting Guidelines output are ‘Standard Disclosure’ class which are the centre or the heart of this research as presented in Figure 4.5.

The ontology approach taken is the top-down approach. There are two different types of ‘Standard Disclosure’ class which are ‘General Standard Disclosure’ class and ‘Specific Standard Disclosure’ class as shown in Figure 4.5.

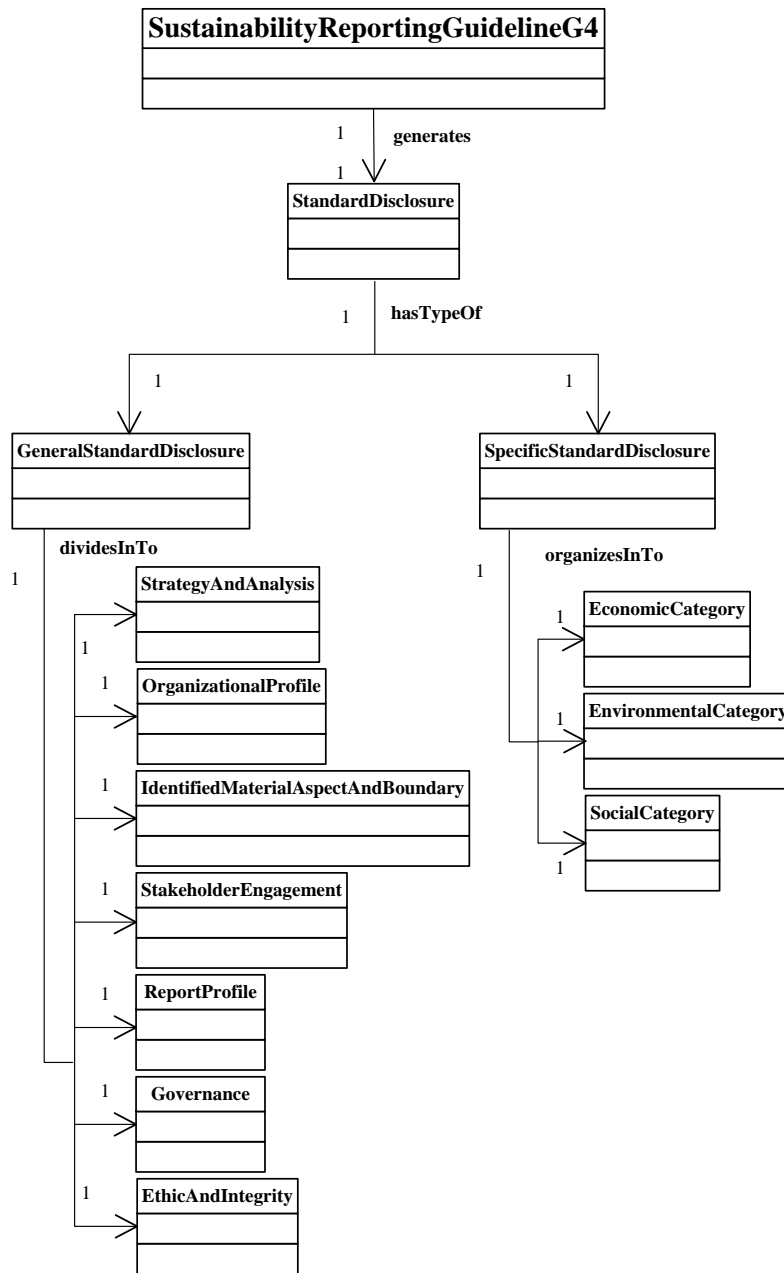


Figure 4.5 Ontology formalization for 'Sustainability Reporting Guideline G4' class

4.3.1. Ontology for ‘General Standard Disclosure’ class

The class ‘General Standard Disclosure’ is a central element of Core and Comprehensive options and should be disclosed for both options (Global Reporting Initiative 2013a, 2013b). The ‘General Standard Disclosure’ class as shown in Figure 4.5 is divided into seven classes: ‘Strategy and Analysis’ class, ‘Organizational Profile’ class, ‘Identified Material Aspect and Boundary’ class, ‘Stakeholder Engagement’ class, ‘Report Profile’ class, ‘Governance’ class, and ‘Ethics and Integrity’ class.

The Classes names, properties, relationships for ‘General Standard Disclosure’ class are provided in the following section. The classes’ names and properties are written in spaces for better understanding which is different from UML language used to formalize the Conceptual Model for GRI Sustainability Reporting Guidelines G4.

4.3.1.1. Ontology for ‘Strategy and Analysis’ class (G4-1 and 2)

Strategy and Analysis is an insight on general plan view of organization sustainability on strategic topics rather than the summary of the content of sustainability report topics.

This class includes two subclasses. They are ‘Statement From Most Senior Decision Maker of Organization’ class and ‘Key Impact Risk and Opportunity’ class as shown in Figure 4.6. The first one is required for General Standard Disclosures for the “in accordance”- Core criteria option. Both classes are required for General Standard Disclosures for the “in accordance”- Comprehensive criteria option. The data property for these classes can be found in Table 8.2.

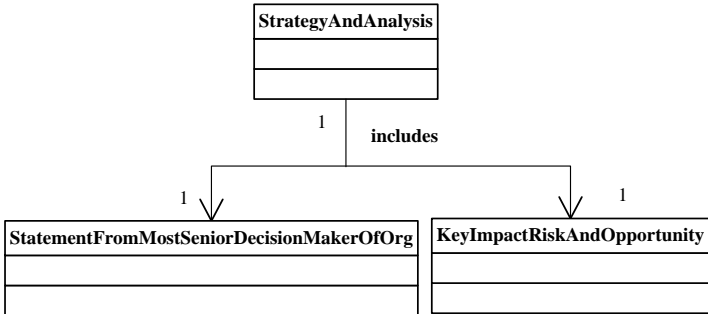


Figure 4.6 Ontology formalization for ‘Strategy And Analysis’ class

4.3.1.1.1. Ontology for 'Statement From Most Senior Decision Maker Of Org' class

Statement from the most senior decision-maker of in the organization: this is a declaration or announcement made by the Chief Executive Officer (CEO) or chairman that presents a general plan for the short term, medium term and long term sustainability of the organization that includes: strategic priorities and key issues; the impact of macroeconomic or political events; the main activities have done and the successes achieved and not achieved; comparison actual performance with the planned performance; viewpoint includes encounters, threats, and objectives for the organization in the near future; and any other points that are related to the organization's strategic approach.

4.3.1.1.2. Ontology for 'Key Impact Risk And Opportunity' class

Key impacts, risks, and opportunities: It refers to the organizational Main influences on sustainability and effects on stakeholders. In addition, it should focus on the impact of sustainability on tendencies, threats, and on the long term prospects and financial performance of the organization.

4.3.1.2. Ontology for 'Organizational Profile' class (G4-3 to 13)

Organizational Profile is a short description of the organization's identity that provides useful information about it. For example, name; the primary brands, products, and services; location of organization headquarters; the name and number of countries where the organization operates; the nature of ownership and legal form; the markets served and types of customers; the scale of organization; employee overview; employees covered by collective bargaining agreements; organization supply chain; changes during the reporting period regarding the organization size, structure, ownership, or its supply chain; and commitments to external initiatives.

This class consists of twelve classes as shown in Figure 4.7. In addition, all these classes are required for both options and the data properties for all classes contained is shown in Table 8.4 to Table 8.14.

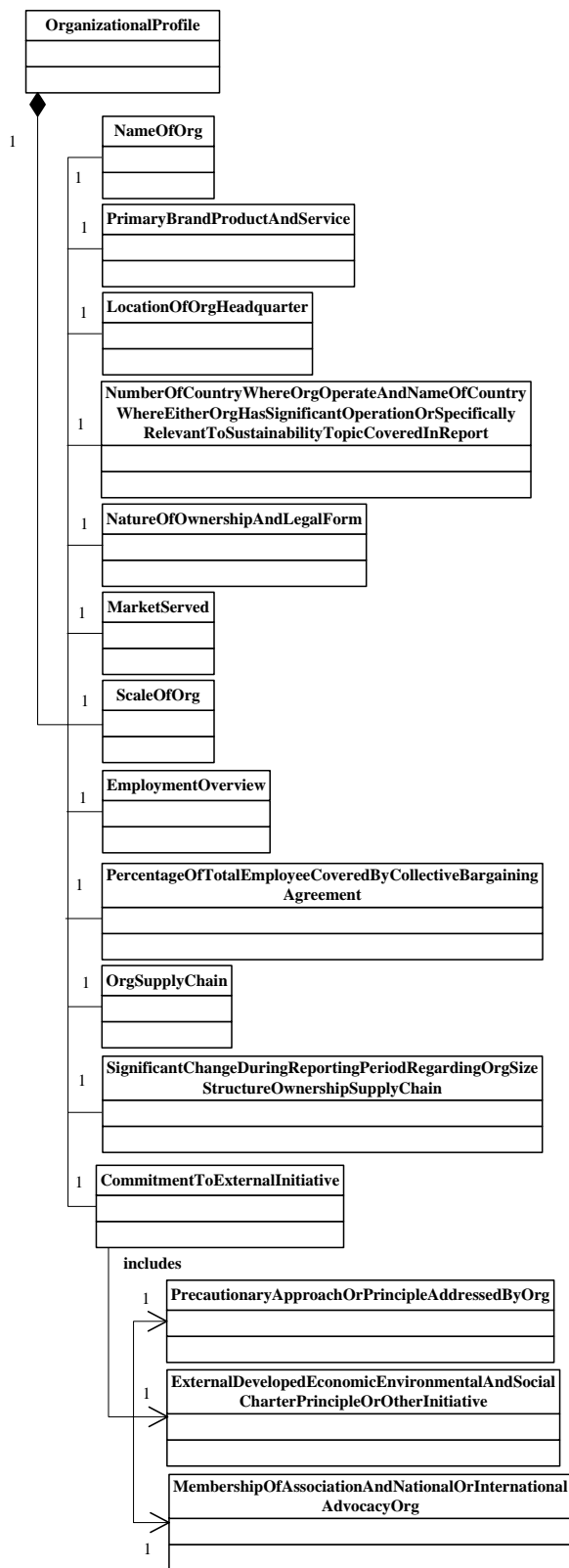


Figure 4.7 Ontology formalization for 'Organizational Profile' class

4.3.1.2.1. Ontology for 'Commitment To External Initiative' class (G4-14 to 16)

It includes three classes as presented in Figure 4.7.

4.3.1.2.1.1. Ontology for 'Precautionary Approach Or Principle Addressed By Org' class/ G4-14

Precautionary Approach Or Principle Addressed By Org :It refers to the organization management system that adopts national or international standards to support the organization in its efforts to meet environmental regulations in which the organization it operates. In addition, purposes, principles, values and commitments are taken to identify risks and opportunities in operation and to guarantee the business works under health and safe environment. The data property can be found in Table 8.15.

4.3.1.2.1.2. Ontology for 'External Developed Economic Environmental And Social Charter Principle Or Other Initiative To Which Org Subscribe' class/ G4-15

External Developed Economic Environmental and Social Charter Principle Or Other Initiative To Which Org Subscribe: It refers to international laws and regulations, covenant that conduct organization economic, environmental, and social activities. In addition, it includes internal and external indexes and benchmarks that participate by organization. The data property can be found in Table 8.16.

4.3.1.2.1.3. Ontology for 'Membership Of Association And National Or International Advocacy Org' class/ G4-16

Membership Of Association and National Or International Advocacy Org: It refers to organization participation in industry and business association, internal and external, in projects or committees membership, hold position on the governance body. The data property can be seen in Table 8.17.

4.3.1.3. Ontology for 'Identified Material Aspect And Boundary' class (G4-17 to 23)

Identified material Aspect and boundary: It refers to the process of defining Report Content, identifying material Aspects, reporting Aspect Boundary within and outside the organization, and reporting for any restatements of information provided in previous reports.

This subclass consists of further subdivisions as illustrated in Figure 4.8.

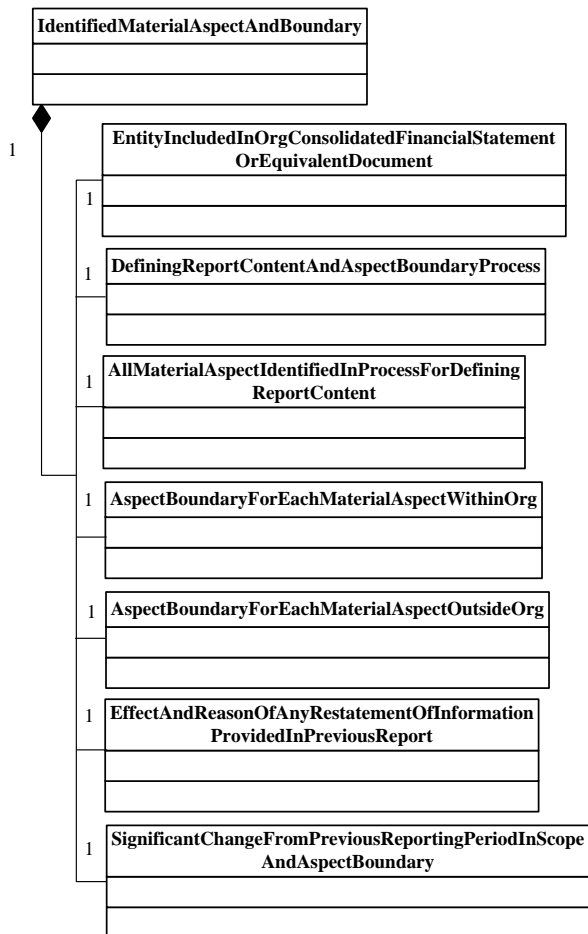


Figure 4.8 Ontology formalization for 'Identified Material Aspect And Boundary' class

4.3.1.3.1. Ontology for 'Entity Included in Org Consolidated Financial Statement Or Equivalent Document' class/ G4-17

Entity included in the organization’s consolidated financial statements or equivalent documents: It refers to list all organization’s entity included in the organization’s consolidated financial statements or equivalent documents. In addition, to report whether any above entity is not covered by the report. The data property can be seen in Table 8.18.

4.3.1.3.2. Ontology for 'Defining Report Content And Aspect Boundary' class/ G4-18

Defining Report Content and Aspect Boundaries: It discusses the process that defines report content and the Aspect Boundaries. Besides, it explains how the Reporting Principles are applied to define Report Content. The data property can be seen in Table 8.19.

4.3.1.3.3. Ontology for 'All Material Aspect Identified In Process For Defining Report Content' class/ G4-19

All material Aspects identified in the process for defining report content: It relates to state all the material Aspect identified in the defining report process content. The data property can be seen in Table 8.20.

4.3.1.3.4. Ontology for 'Aspect Boundary For Each Material Aspect Within Org' class/ G4-20

Aspect boundary for each material Aspect within the organization: It explains border in regard to the Aspect Boundary within the organization for each material Aspect. For instance, is the Aspect material within the organization or not; if the Aspect is material or not material for all entities or groups of entities included in the organization's consolidated financial statements or equivalent documents; and any other limitation within the organization in regard to this point. The data property can be seen in Table 8.21.

4.3.1.3.5. Ontology for 'Aspect Boundary For Each Material Aspect Outside Org' class/ G4-21

Aspect boundary for each material Aspect outside the organization: It explains border in regard to the Aspect Boundary outside the organization for each material Aspect. For instance, is the Aspect material outside the organization or not; in case the Aspect is material, identify all entities or groups of entities included in the organization's consolidated financial statements or equivalent documents; and states any in particular limitation outside the organization in regard to this point. The data property can be seen in Table 8.22.

4.3.1.3.6. Ontology for 'Effect and Reason Of Any Restatement Of Information Provided In Previous Report' class/ G4-22

Effect and reasons of any restatements of information provided in previous report: It refers to any adjusted of information presented in previous reports and its effects and the reasons. The data property can be seen in Table 8.23.

4.3.1.3.7. Ontology for 'Significant Change From Previous Reporting Period In Scope and Aspect Boundary' class/ G4-23

Significant changes from previous reporting periods in the scope and Aspect Boundaries. It explains the main differences in regard to Scope and Aspect Boundary from preceding reports. The data property can be seen in Table 8.24.

4.3.1.4. Ontology for ‘Stakeholder Engagement’ class (G4-24 to27)

Stakeholder Engagement: A stakeholder is ‘an individual or group having a legitimate claim on the firm - someone who can affect or is affected by the firm’s activities’ (Freeman 1984; mattingly and Greening 2002, quoted in Tilt 2007, 104). They are: shareholders, employees, creditors, suppliers, customers, banks, government, community, public interest groups and the general public (Estes, 1976; Ogan and Ziebart, 1991; Tilt, 1997, quoted in Tilt 2007). They are involved with the organization’s activities during the reporting period.

This class consists of four subdivisions as illustrated in Figure 4.9 representing the components of this class and data properties are explained in Table 8.25 to Table 8.28. It refers to a list of stakeholder groups involved with the organization; principles or reasons why the organization is involved with specific groups of stakeholders; methodology by which the organization is involved with stakeholders, besides, identifies the periodicity of engagement by type and by stakeholder group. In addition, indicates the possibilities of engagement as the result of the process of preparation of the report; main subjects and matters caused by stakeholder engagement. In addition, in what way the organization deals with those subjects and matters during the reporting process. It should also identify the stakeholder groups associated with these subjects and matters.

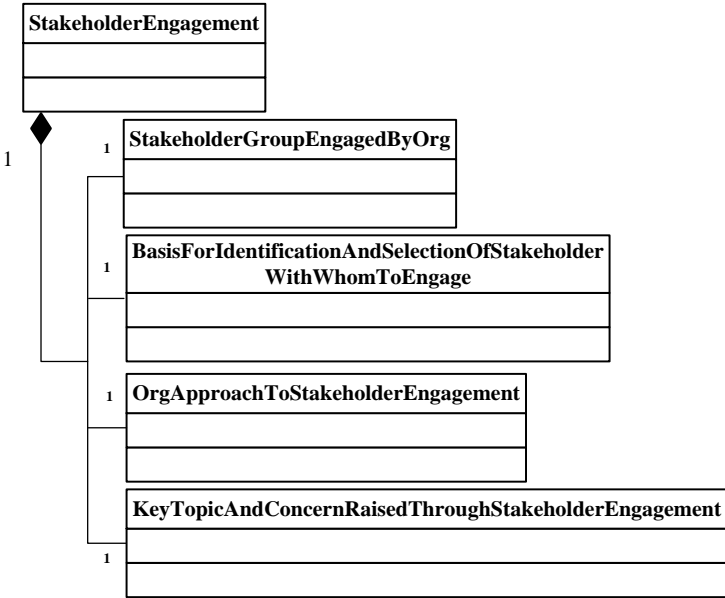


Figure 4.9 Ontology formalization for ‘Stakeholder Engagement’ class

4.3.1.5. Ontology for 'Report Profile' class (G4-28 to 33)

Report profile: It focuses on three main points which are: information about report in regard to reporting period, date of most recent previous report, reporting cycle, and contact for any questions for the report or its contents; GRI Content Index; and the organization's policy and current practice when seeking external assurance for the report. This class consists of six subdivisions as illustrated in Figure 4.10 indicating the names of classes. The data properties are shown in Table 8.29 to Table 8.34.



Figure 4.10 Ontology formalization for 'Report Profile' class

4.3.1.6. Ontology for 'Governance' class (G4-34 to 55)

Governance: There is no definition given for governance class in GRI G4. It relates in a general sense to 'the exercise of control and authority' thus, 'corporate governance is about the process and content of decision making in business organizations' (McAlister 2003, 169,171). This class consists of seven classes as illustrated in Figure 4.11.

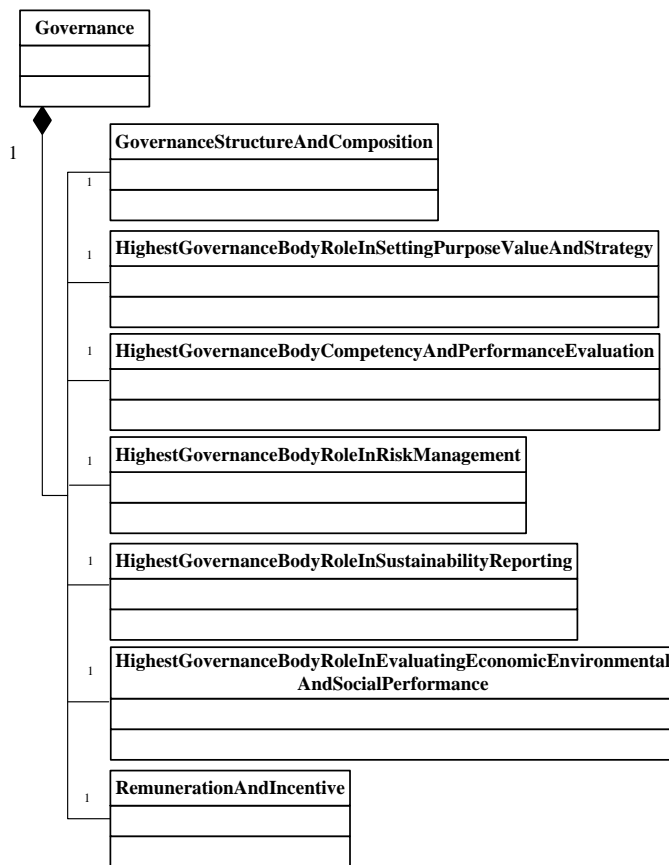


Figure 4.11 Ontology formalization for ‘Governance’ class

4.3.1.6.1. Ontology for ‘Governance Structure And Composition’ class (G4-34 to 41)

Governance structure and composition: It refers to how the governance body is constructed and its components. In addition, it assigns the committees responsible for sustainability impacts.

This class consists of eight classes as presented in Figure 4.12.

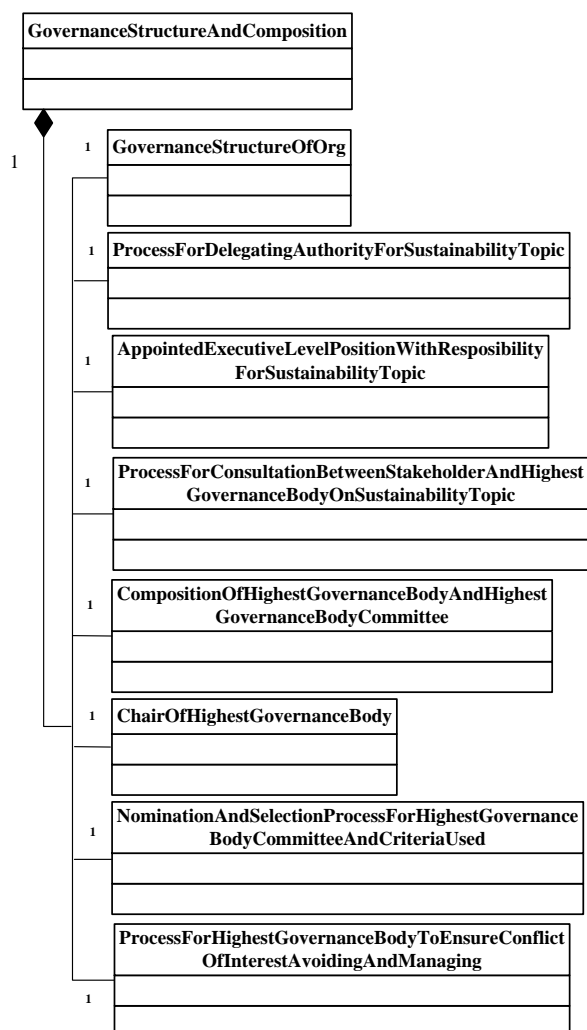


Figure 4.12 Ontology formalization for ‘Governance Structure And Composition’ class

The following subsections specify to define each class belong to this above class.

4.3.1.6.1.1. Ontology for ‘Governance Structure Of Org’ class/ G4-34

Governance structure of the organization: It refers to the body of highest governance and decision-maker committees on sustainability impacts. The data properties are presented in Table 8.35.

4.3.1.6.1.2. Ontology for 'Process For Delegating Authority For Economic Environmental And Social Topic' class/ G4-35

Process for delegating authority for economic, environmental and social topic from the highest governance body to senior executives and other employees: It refers to the process of authorizing powers from the highest to the lowest governance body in the organization in regard to sustainability topics. The data property is presented in Table 8.36.

4.3.1.6.1.3. Ontology for 'Appointed Executive Level Position With Responsibility For Sustainability Topic' class/ G4-36

Appointed an executive-level position with responsibility for sustainability topics: It refers to possibilities of choosing position for executive-level with sustainability topics responsibility, and the probability sending directly report to the highest governance body. The data property is presented in Table 8.37.

4.3.1.6.1.4. Ontology for 'Process For Consultation Between Stakeholder And Highest Governance Body On Sustainability Topic' class/ G4-37

Process for consultation between stakeholders and the highest governance body on sustainability topics: It explains the discussions between the stakeholders and the highest governance body before decisions are made on sustainability topics. In addition, in case the decisions are made, the process to whom and feedback consultations to the highest governance body should describe. The data property is presented in Table 8.38.

4.3.1.6.1.5. Ontology for 'Composition Of Highest Governance Body And Highest Governance Body Committee' class/ G4-38

Composition of the highest governance body and its committees: This refers to components the committees of the highest governance body by executive or non-executive; independence; tenure on governance body; number of each individual's other significant positions and commitments and the nature of commitments; gender; membership of under-represented social groups; competences relating to economic, environmental and social Impacts; and stakeholder representation. The data property is presented in Table 8.39.

4.3.1.6.1.6. Ontology for 'Chair Of Highest Governance Body' class/ G4-39

Chair of the highest governance body: It identifies the possibilities of the chair of highest governance body is an executive officer within the organization and if yes, what the function within organization's management performs? and why this agreement? The data property is presented in Table 8.40.

4.3.1.6.1.7. Ontology for 'Nomination And Selection Process For Highest Governance Body Committee And Criteria Used' class/ G4-40

Nomination and selection processes for the highest governance body committees and the criteria used for: It refers to describe the process of formally suggestion the highest governance body members. In addition, the standards and principles followed to this process. The data property is presented in Table 8.41.

4.3.1.6.1.8. Ontology for 'Process For Highest Governance Body To Ensure Conflict Of Interest Avoiding And Managing' class/ G4-41

Processes for the highest governance body to ensure conflicts of interest are avoided and managed: It refers to prevent and organize conflict of interest process by highest governance body. In addition, the opportunity this process declared at least to stakeholders? The data property is presented in Table 8.42.

4.3.1.6.2. Ontology for 'Highest Governance Body Role In Setting Purpose Value And Strategy' class (G4-42)

Highest governance body's role in setting purpose, values, and strategy: It refers to role of the governance body and senior executives' in achieving organizational targets in regard to development, approval, and review. In addition, principles; standards; plans for short, medium, and long term; procedures; and objectives in regard to sustainability impacts. The data properties are presented in Table 8.43.

4.3.1.6.3. Ontology for 'Highest Governance Body Competency And Performance Evaluation' class (G4-43 to 44)

Highest governance body competency and performance evaluation: It refers to qualification, knowledge, and experiences that member and senior executives should have in regard to sustainability topic to insure that high quality governance supports organization long-term value creation. This class consists of two classes as illustrated in Figure 4.13 and as defined below.

Measure Taken To Develop and Enhance Highest Governance Body Collective Knowledge Of Economic Environmental and Social Topic: It refers to actions or ways taken to develop the qualification, knowledge of highest governance body's and senior executives' regarding sustainability areas. The data property can be found in Table 8.44.

Process For Evaluation and Action Taken In Response To Evaluation Of Highest Governance Body Performance: It refers to internal and external assessment process, rate of occurrence and actions taken to improve the highest governance body's performance in regard to sustainability matters. The data property can be found in Table 8.45.

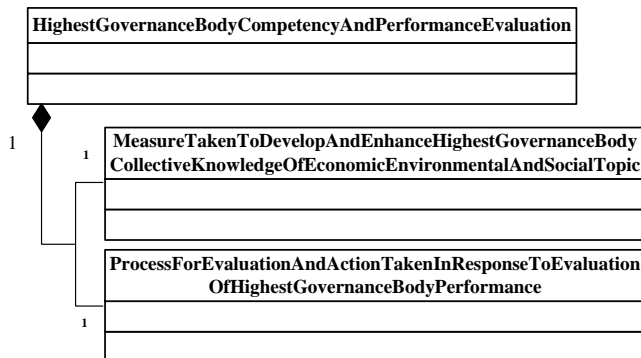


Figure 4.13 Ontology formalization for ‘Highest Governance Body Competency And Performance Evaluation’ class

4.3.1.6.4. Ontology for ‘Highest Governance Body Role In Risk Management’ class (G4-45 to 47)

Highest governance body role in risk management: It refers to identify, manage risk, consult with stakeholder, and assess risk management process in a consistent manner to insure long term organization sustainability. This class consists of three classes as illustrated in Figure 4.14. The following definitions for these classes are below:

Highest Governance Body Role In Identification and Management Of Economic Environmental and Social Impact Risk and Opportunity: It refers to the responsibility of the governance body to recognize and understand sustainability impacts, risks, and opportunities and discuss with organization stakeholder. The data property is presented in Table 8.46.

Highest Governance Body Role In Reviewing Effectiveness Of Org Risk Management Process For Economic Environmental and Social Topic: It refers to role of highest governance body to assess, control and monitor the process of risk management for sustainability topics. The data property is presented in Table 8.47.

Frequency of the highest governance body’s review of economic, environmental and social impacts, risks, and opportunities: It refers to the how often the highest governance body assess, control and monitor the process of risk management for sustainability topics. The data property is presented in Table 8.48.

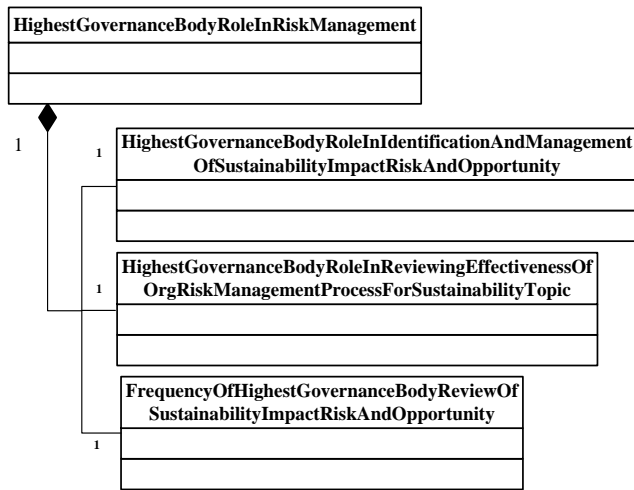


Figure 4.14 Ontology formalization for ‘Highest Governance Body Role In Risk Management’ class

4.3.1.6.5. Ontology for ‘Highest Governance Body Role In Sustainability Reporting’ class G4-48

Highest governance body role in sustainability reporting: It refers to the responsibility of highest governance committee body to review officially and to confirm the organization’s sustainability report and to guarantee that all material Aspects are reported. The data property is presented in Table 8.49.

4.3.1.6.6. Ontology for ‘Highest Governance Body Role In Evaluating Economic Environmental And Social Performance’/ class G4-49 and G4-50

Highest governance body’s role in evaluating economic, environmental and social performance: It refers to address and monitor the risks and opportunities of economic, environmental, and social performance and to communicate these concerns to the highest governance body and the methods used to resolve them. This class consists of two classes as shown in Figure 4.15.

Process for communicating critical concerns to the highest governance body: It refers to address and monitor serious matters process regarding to the risks and opportunities of economic, environmental, and social performance and the role of the organization to communicate them to the highest governance body. The data property is presented in Table 8.50.

Nature and Total Number Of Critical Concern: It refers to basic features, character or qualities and total number of serious matters regarding to economic, environmental, and social performance to share with highest governance body. In addition, the actions taken to solve these concerns. The data property is presented in Table 8.51.

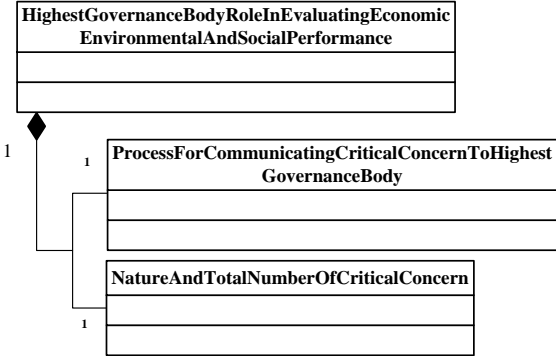


Figure 4.15 Ontology formalization for ‘Highest Governance Body Role In Evaluating Economic Environmental And Social Performance’ class

4.3.1.6.7. Ontology for ‘Remuneration And Incentive’ class (G4-51 to G4-55)

Remuneration and incentive: It is the compensation received for services or employment. It includes the remuneration rules and the standards and policies applied for different types of remuneration for governance members and senior executives. This class consists of five classes as presented in Figure 4.16.

Remuneration policies for the highest governance body and senior executives: It refers to the highest governance body and senior executive’s remuneration procedures and what types of remuneration they earned. In addition, identify performance criteria in the remuneration policy in regard to sustainability objectives. The data property is presented in Table 8.52.

Process For Determining Remuneration: It refers to what extent the professionals are engaged in determining remuneration process, to what extent the process is self-determining, and to what extent the professionals have any relationships with the organization. The data property is presented in Table 8.53.

How Stakeholder View Is Sought and Taken In To Account Regarding Remuneration: It refers to in what way the stakeholders opinions are considered about remuneration. Besides,the outcomes of voting and the suggestions on remuneration plan. The data property is presented in Table 8.54.

Ratio of the annual total compensation for the organization’s highest-paid individual in each country of significant operations to the median annual total compensation for all employees in the same country: It should identify the following variables: the ratio of the annual total compensation for the organization’s highest-paid individual; in each country of significant operations; the median annual total compensation for all employees; the highest-paid individual in the same country is excluded. The data property is presented in Table 8.55.

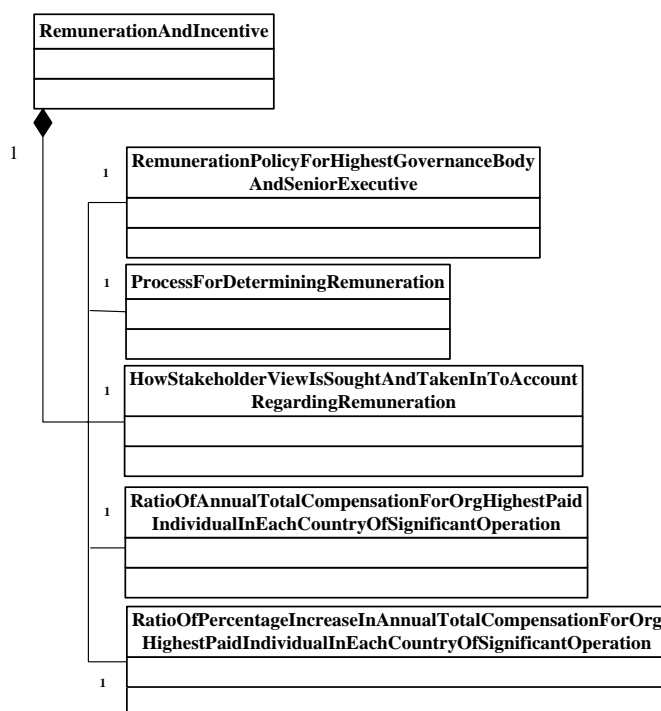


Figure 4.16 Ontology formalization for ‘Remuneration And Incentive’ class

4.3.1.7. Ontology for ‘Ethic And Integrity’ class (G4-56 to G4-58)

Ethics and integrity: It refers to the moral behaviour within a given organisation. It refers to the moral principles, standards, values extolled by the governance process in relation to the organization’s behaviour when conducting its activities. For example, codes of conduct and codes of ethics. This class consists of three classes as shown in Figure 4.17. The definitions for these classes are below:

Organization’s values, principles, standards and norms of behaviour: It refers to the organization’s ethical standards, values, principles and norms in governing and conducting business activities. For example for values safety, integrity, teamwork, social responsibility, and innovation, sustainability, respect, performance, simplicity, and accountability. The data property is presented in Table 8.57.

Internal and external mechanisms for seeking advice on ethical and lawful behaviour, and matters related to organizational integrity. It refers to the ways the organisation accesses consultant advice (internal or external) relating to ethics and integrity concerns for example access on line internet. The data property is presented in Table 8.58.

Internal and external mechanisms for reporting concerns about unethical or unlawful behaviour, and matters related to organizational integrity: It refers to the organization’s means and methods used to publicize unethical behaviour such as hotlines. The data property is presented in Table 8.59.

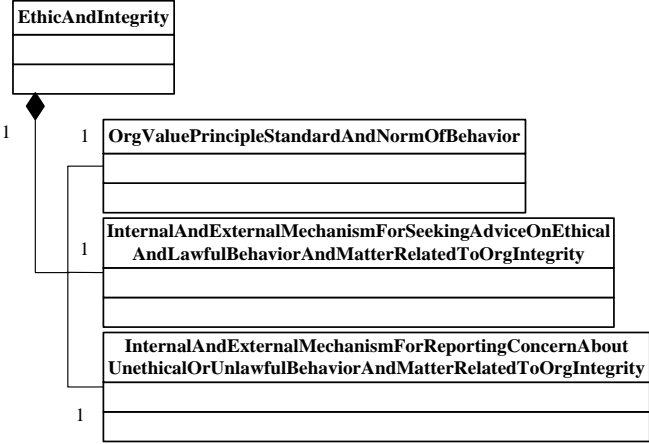


Figure 4.17 Ontology formalization for ‘Ethic And Integrity’ class

4.3.2. Ontology for ‘Specific Standard Disclosure’ class

The ‘Specific Standard Disclosure’ class is organized in to ‘Economic Category’ class, ‘Environmental Category’ class and ‘Social Category’ class. In addition, ‘Social Category’ class is categorized in to sub category ‘Labor Practice and Decent Work Category’ class, ‘Human Right Category’ class, ‘Society Category’ class, and ‘Product Responsibility Category’ class as shown in Figure 4.18. Furthermore, each category class consists of subsidiary ‘Aspects’: for example, for ‘Economic Aspect’ class there are four Aspect; for ‘Environmental Aspect’ class, there are twelve Aspects; for ‘Labor Practice and Decent Work Aspect’ class, there are eight Aspects; for ‘Human Right Aspect’ class’ there are ten Aspects; for ‘Society Aspect’ class, there are seven Aspects; and for ‘Product Responsibility Aspect’ class, there are five Aspects as presented in Figure 4.19.

It should be noted that, after the organization identifies the material Aspects, information for each can be reported as a DMA class and as Indicators. Organizations should disclose at least one indicator related to each identified material Aspect if they are ‘in accordance’ - Core option. While organizations should disclose all indicators related to each identified material Aspects if they are ‘in accordance’ - Comprehensive option.

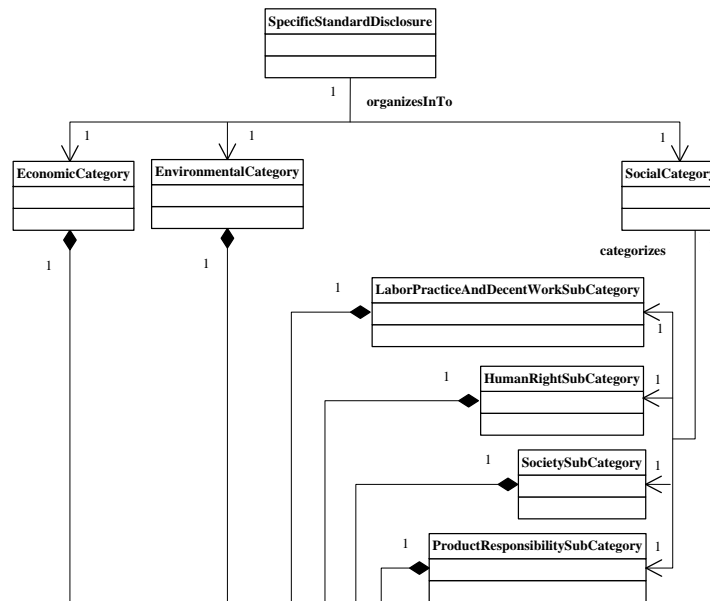


Figure 4.18 Ontology formalization for ‘Specific Standard Disclosure Category’ class

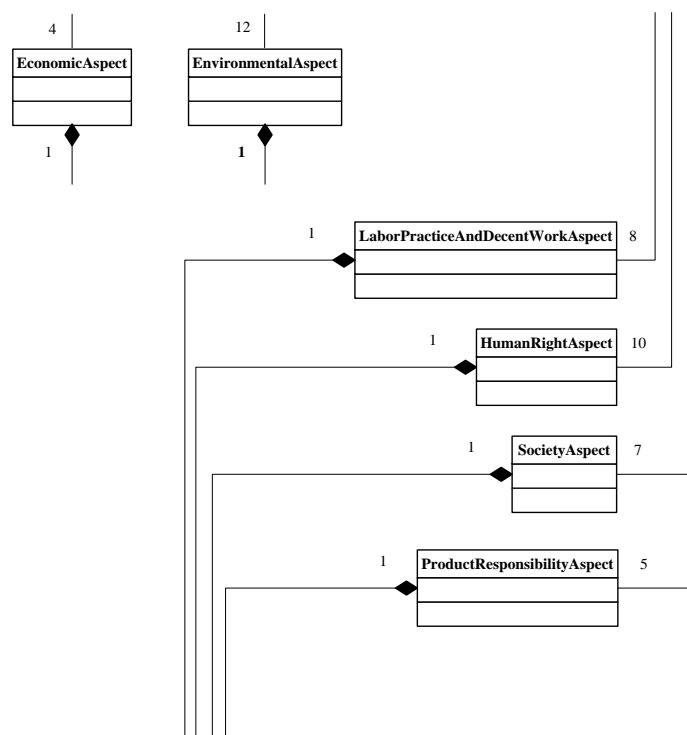


Figure 4.19 Ontology formalization for ‘Economic, Environmental And Social Aspect’ class

4.3.2.1. Ontology for ‘Disclosure On Management Approach’ DMA class

Disclosure on management approach: This explains how the organization managed the material Aspects of economic, environmental and social impacts. In addition, it reports specific management practices in terms of policies, commitments, goals and targets, responsibilities, resources and specific actions (Global Reporting Initiative 2013b, 62-63). There are two types of Guidance for DMA according to GRI G4. They are: Generic DMA Guidance and Aspect-specific DMA Guidance. Organizations consider Generic DMA Guidance first and then if Aspect-specific DMA Guidance is involved, organizations report in more detail. However, GRI G4 has not been developed for every Aspect in the Guidelines and it accounts for twenty-three of the forty-six Aspects (Global Reporting Initiative 2013b, 63).

4.3.2.2. Ontology for ‘Performance Indicator’ class

Indicator: This class presents qualitative or quantitative information on the economic, environmental and social performance or impacts of an organization in regard to its material Aspect for a given reporting period. GRI G4 includes ninety one indicators. For ‘Economic Aspect’ class, there are nine indicators; and for ‘Environmental Aspect’ class, there are thirty four indicators; the ‘Social Aspect’ class is further sub-divided. For Labor Practice and Decent Work Aspect’ class, there are sixteen indicators; for ‘Human Right Aspect’ class, there are twelve indicators; for ‘Society Aspect’ class, there are eleven indicators; and for ‘Product Responsibility Aspect’ class, there are nine indicators as illustrated in Figure 4.20. The definitions for each performance indicator as follows (Global Reporting Initiative 2013b):

Economic Performance Indicator: It demonstrates financial flow of capital impact on stakeholders, and on economic systems at local, national, and global levels.

Environmental Performance Indicator: It illustrates qualitative, quantitative information (non-financial) for organization impact on environment input (water), output (emissions), biodiversity, transport, product and service, and environmental compliance excluding monetary value for non-compliance with environmental laws and regulations and total environmental protection expenditures and investments.

Labor Practice and decent Work Performance Indicator: It shows qualitative, quantitative (non-financial) information for organization social responsibility within which it operates based on International standards.

Human Right Performance Indicator: It displays qualitative, quantitative (non-financial) information for organization responsibility to respect human rights and the stakeholders have to enjoy and exercise their human rights based on international legal framework and additional instruments for human rights.

Society Performance Indicator: It presents qualitative, quantitative (non-financial) information for organization responsibility towards society and local communities including monetary value of significant fines for non-compliance with laws and regulations.

Product Responsibility Performance Indicator: It clarifies qualitative, quantitative (non-financial) information for organization responsibility towards in particular customers in regard to product and services provided to them excluding monetary value of significant fines for non-compliance with laws and regulations.

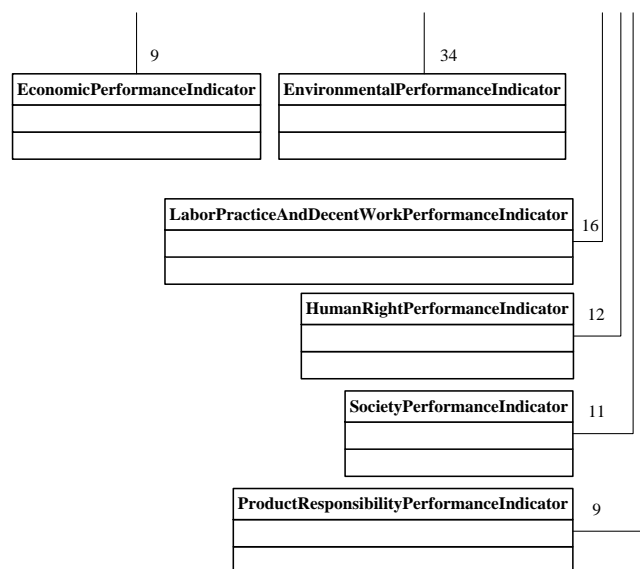


Figure 4.20 Ontology formalization for ‘Economic, Environmental And Social Performance Indicator’ class

4.4. Summary

The object of this chapter has been to develop an ontology life cycle development process with respect to GRI G4. An overview of the GRI G4 Standard Disclosures specifications is explained. In this regard, the classes, properties and relationships of the two different types of ‘Standard Disclosure’ class which are defined and formalized, i.e. ‘General Standard Disclosure’ class and ‘Specific Standard Disclosure’ class, using UML and incorporating a top-down hierarchical approach. In the next chapter, the ontology for economic category class is explained using the same approach.

Chapter 5. Ontology for economic category class

5.1. Introduction

This category focuses on the financial organization’s performance and impacts on the stakeholders by clarifying the flow of capital among them; it does not focus on the financial status of the organization. In addition, it focuses on economic systems at local, national, and global levels (Global Reporting Initiative 2013b, 67). In this chapter, the ontologies for four Aspects are explained, focussing on indicators. The summary is in section (5.3).

5.2. Ontology for ‘Economic Aspect’ class

There are four Aspects as classes within the ‘Economic Category’ class – the ‘Economic Performance Aspect’ class, the ‘Market Presence Aspect’ class, the ‘Indirect Economic Impact Aspect’ class, and the ‘Procurement Practice Aspect’ class as depicted in Figure 5.1. The following subsection explains the ontology for each Aspect.

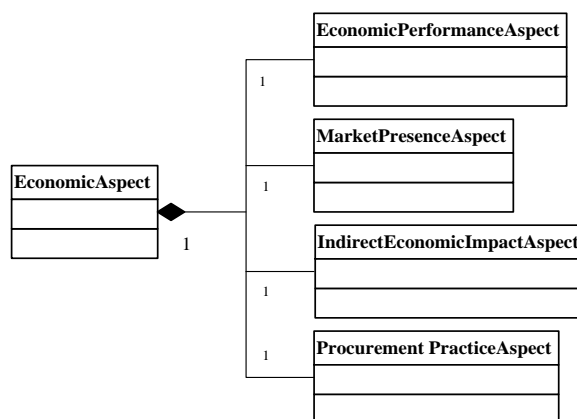


Figure 5.1 Ontology formalization for ‘Economic Aspect’ class

5.2.1. Ontology for ‘Economic Performance Aspect’ class

This is the first aspect which addresses the “direct value generated” (English and K.Schooley 2014) of the organization’s activities and immediate consequences of monetary flows to stakeholders. There is a generic DMA and four indicators related to this indicator class as shown in Figure 5.2.

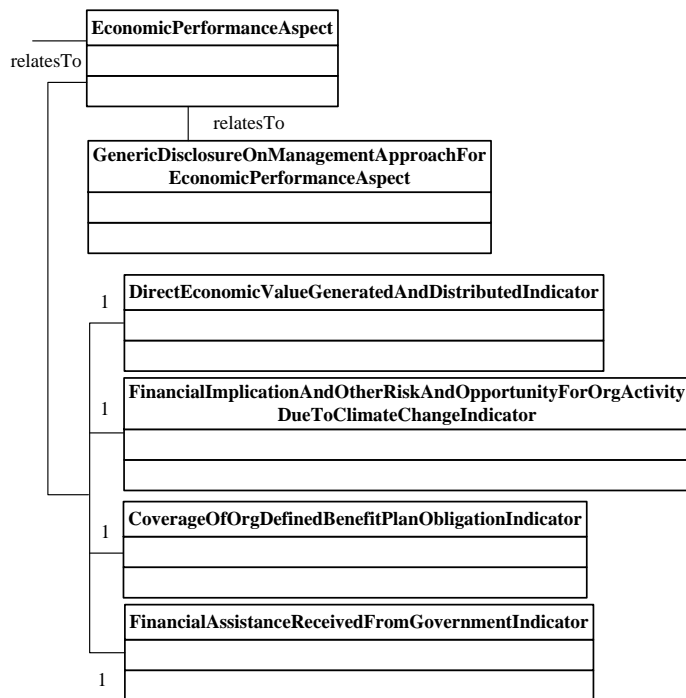


Figure 5.2 Ontology formalization for 'Economic Performance Aspect' class

In the following subsections, the ontologies for the four indicators of the class 'Economic Performance Aspect' are presented.

5.2.1.1. Ontology for 'Direct Economic Value Generated and Distributed Indicator' class/ EC1

This indicator class concerns the economic value generated and distributed (EVG&D). The concept that is related to this indicator is 'Economic Value Retained' class. The class 'Organization' retains 'Economic Value Retained'. This class is obtained from the 'Direct Economic Value Generated' class and 'Economic Value Distributed' class. The class 'Organization' generates the 'Direct Economic Value Generated' class. In addition, the class 'Organization' distributes 'Economic Value Distributed' class. The class 'Direct Economic Value Generated' is generated from 'Revenue' class. The class 'Economic Value Distributed' is distributed to: 'Operation Cost' class; 'Employee Wage and Benefit' class; 'Payment To providers of Capital' class; 'Payment To Government' class; and 'Community Investment' class (Global Reporting Initiative 2013b, 69-70) as shown in Figure 5.3. The data properties for all classes for this indicator can be found in Tables 8.60 to 8.70.

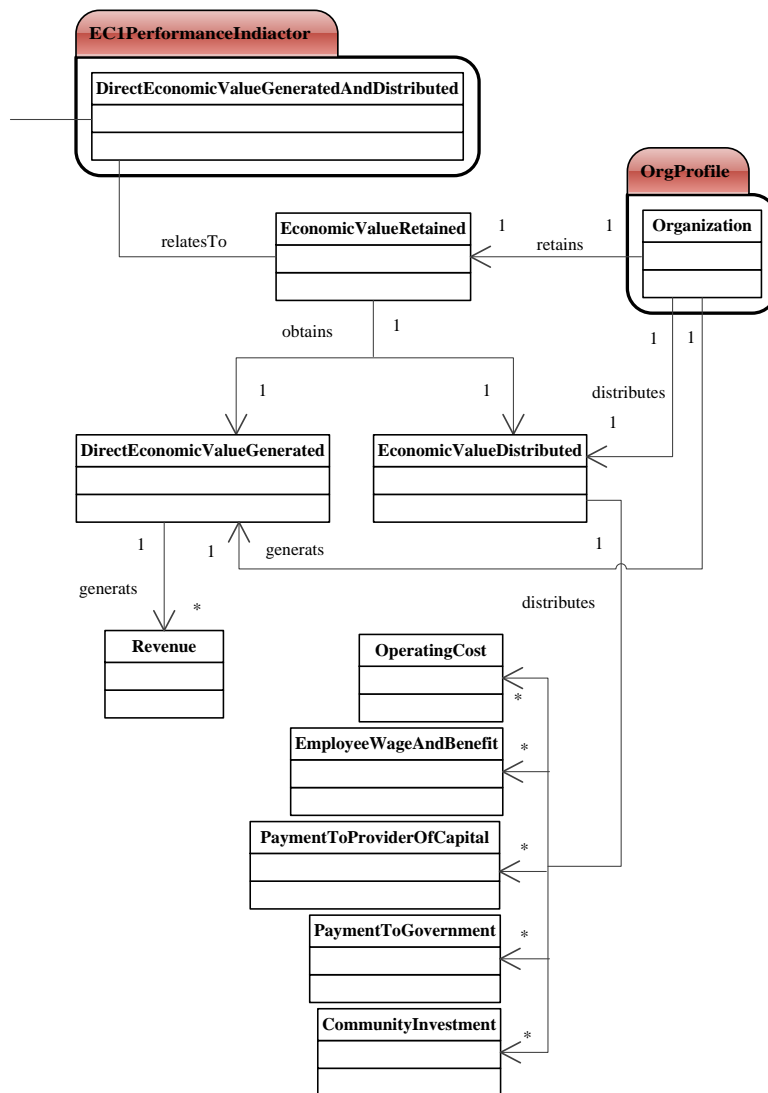


Figure 5.3 Ontology formalization for ‘Direct Economic Value Generated And Distributed Indicator’ class

5.2.1.2. Ontology for ‘Financial Implication And Other Risk And Opportunity For Org Activity Due To Climate Change Indicator’ class/ EC2

This indicator centres on how climate change affects economic performance. It is required to identify ‘Climate Change Risk’ class and ‘Climate Change Opportunity’ class that posed by ‘Climate Change’ class. The class ‘Climate Change Risk’ categorizes risk according to ‘Physical Risk’ class, ‘Regular Risk’ class, and ‘Other Risk’ class. The class ‘Climate Change Opportunity’ categorizes opportunity according to ‘Physical Opportunity’ class, ‘Regular Opportunity’ class and ‘Other Opportunity’ class (Global Reporting Initiative 2013b, 71-72) as depicted in Figure 5.4. The data properties can be found in Tables 8.71 to 8.76.

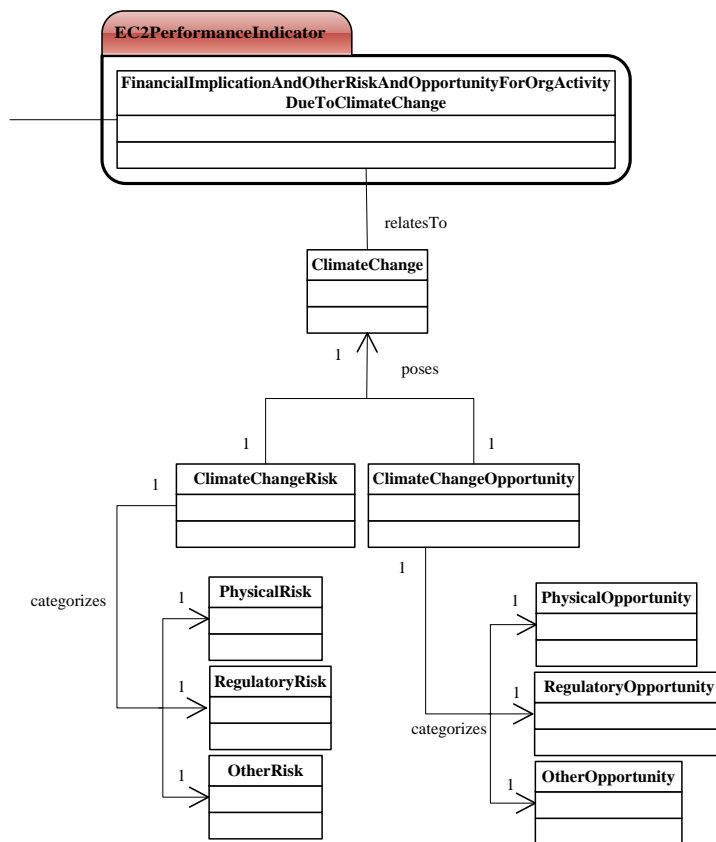


Figure 5.4 Ontology Formalization for ‘Financial Implication And Other Risk and Opportunity For Org Activity Due To Climate Change Indicator’ class

5.2.1.3. Ontology for ‘Coverage Of Org Defined Benefit Plan Obligation Indicator’ class/ EC3

This indicator class focuses on structure of retirement plan offered to employee. The concept that is related to this indicator is ‘Structure Of Retirement Plan Offered To Employee’ class whether is based on ‘Defined Benefit Plan’ class; ‘Defined Contribution Plan’ class; and ‘Other Type Of Retirement Benefit’ class. For class ‘Defined Benefit Plan’ whether is funded by ‘Org General Resource’ class or by the class ‘Separate Fund’ which is used to pay to ‘Pension Liability’ class which is kind of ‘Liability’ class. For class ‘Defined Contribution Plan’ is required to report ‘Percentage Of Salary’ class and ‘Level Of Participation’ class. The ‘Percentage Of Salary’ class which is contributed by employee and employer as ‘Contribution Of Employee’ class and ‘Contribution Of Employer’ class. For the class ‘Other Type Of Retirement Benefit’ is specified where not fully covered by general resource and separate fund. In addition, the class ‘Jurisdiction Regarding Calculation Plan Coverage’ is required to identify calculations used to determine plan coverage (Global Reporting Initiative 2013b, 73) as shown in Figure 5.5. The data properties can be found in Table 8.77 to 8.81.

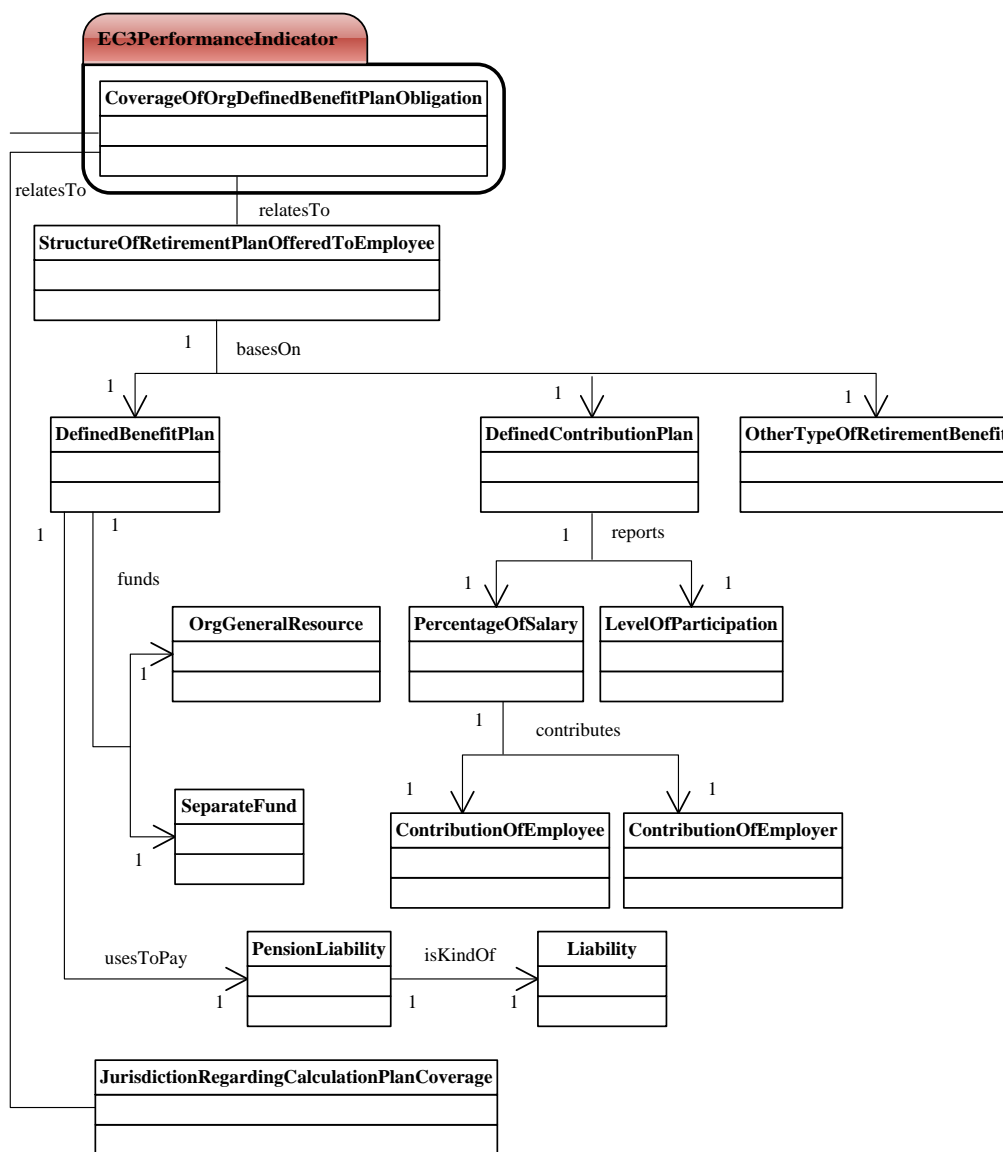


Figure 5.5 Ontology formalization for 'Coverage Of Org Defined Benefit Plan Obligation Indicator' class

5.2.1.4. Ontology for 'Financial Assistance Received From Government Indicator' class/ EC4

This indicator concerns the financial support received from government. The 'Financial Assistance' class is related to this indicator. The class 'Organization' receives 'Financial Assistance' class. It is received from the class 'Government' which is part of 'Stakeholder Group Engaged By Org' class. It is received in 'Reporting Period' class as presented in Figure 5.6. The data properties can be found in (Global Reporting Initiative 2013b, 74).

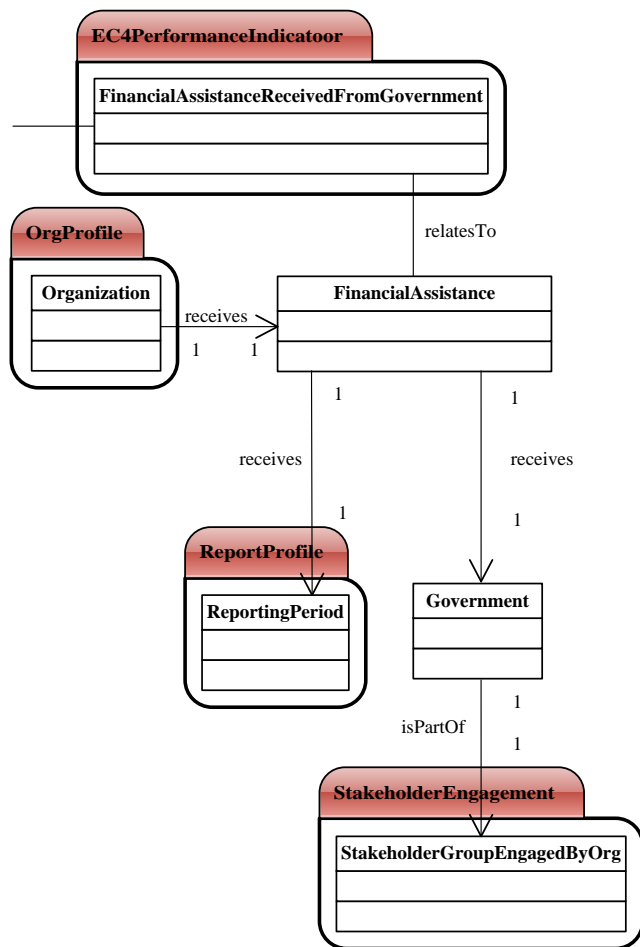


Figure 5.6 Ontology formalization for ‘Financial Assistance Received From Government Indicator’ class

5.2.2. Ontology for ‘Market Presence Aspect’ class

This is the second Aspect that focusses on “entry-level wage by gender compared to local minimum wage” (English and K.Schooley 2014). This Aspect comprises generic DMA and two indicators as shown in Figure 5.7.

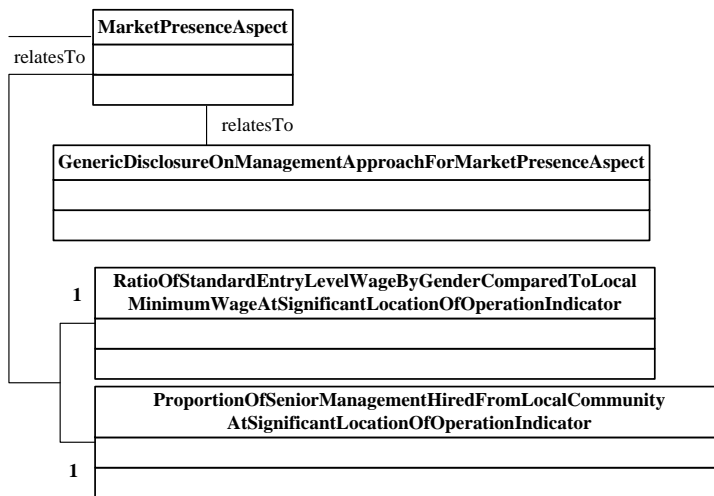


Figure 5.7 Ontology formalization for ‘Market Presence Aspect’ class

The following subsections explain each indicator of this Aspect.

5.2.2.1. Ontology for ‘Ratio Of Standard Entry Level Wage By Gender Compared To Local Minimum Wage At Significant Locations Of Operation Indicator’ class/EC5

This indicator concentrates on entry level wage by gender compared to local minimum wage. The classes that are related to this indicator are: ‘Local Minimum Wage’; ‘Entry Level Wage’; and ‘Ratio Of Standard Entry Level Wage’ class which are presented at ‘Location Of Operation’. The fourth class is ‘Salaried Employment’ which is offered by the class ‘Organization’ (Global Reporting Initiative 2013b, 76) as illustrated in Figure 5.8.

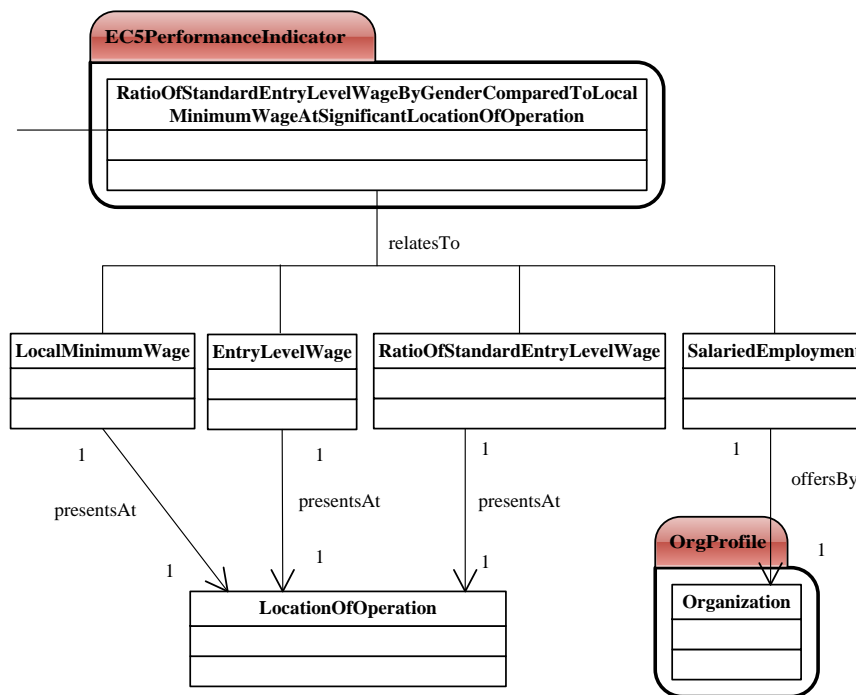


Figure 5.8 Ontology formalization for ‘Ratio of Standard Entry Level Wage By Gender Compared To Local Minimum Wage At Significant Locations Of Operation Indicator’ class.

5.2.2.2. Ontology for ‘Proportion Of Senior Management Hired From Local Community At Significant Location Of Operation Indicator’ class/ EC6

This indicator concentrates on percentage of senior management at significant locations of operation that hired from the local community. So, the concept of ‘Proportion Of Senior Management’ class is related to this indicator class. It is required to report the ‘Percentage Of Senior Management’ class that is hired at ‘Location Of Operation’ class which is hired from ‘Local Community’ class (Global Reporting Initiative 2013b, 77) as displayed in Figure 5.9. The data properties for this indicator can be found partially in Table 8.82.

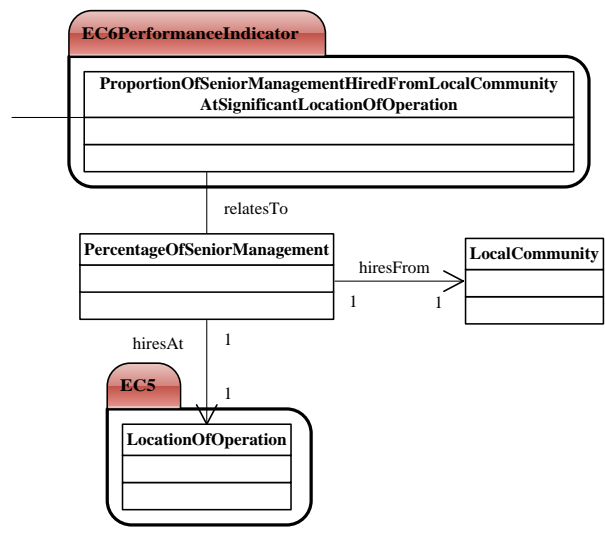


Figure 5.9 Ontology formalization for ‘Proportion Of Senior Management Hired From Local Community At Significant Location Of Operation Indicator’ class

5.2.3. Ontology for ‘Indirect Economic Impact Aspect’ class

This is the third Aspect that emphasizes “impact of infrastructure investments” in relation to local communities and regional economies (English and K.Schooley 2014). There are generic and specific DMA classes and two indicators as presented in Figure 5.10.

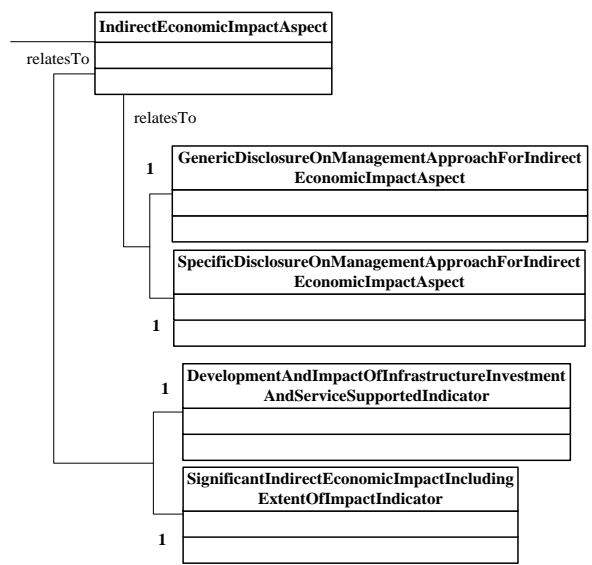


Figure 5.10 Ontology formalization for ‘Indirect Economic Impact Aspect’ class

5.2.3.1. Ontology for ‘Development and Impact of Infrastructure Investment and Service Supported Indicator’ class/ EC7

This indicator focuses on significant infrastructure investment in terms of its development and impact or service supported. The concept related to this indicator is the ‘Infrastructure Investment and Service Supported’ class that has an impact on ‘Community and Local Economy’ class (Global Reporting Initiative 2013b, 79) as shown in Figure 5.11. The data properties can be found in Tables 8.83 and 8.84.

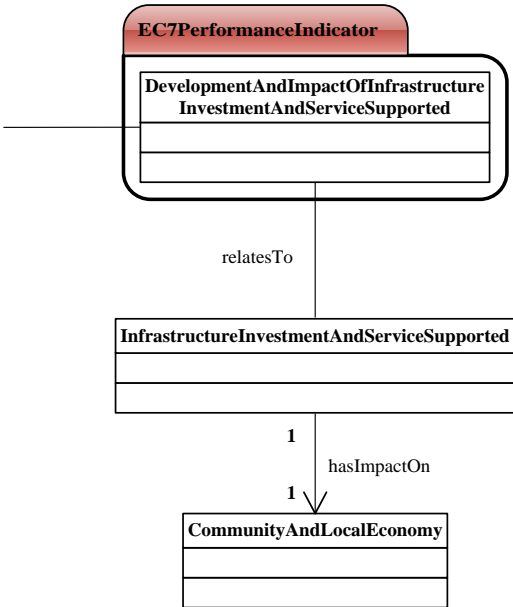


Figure 5.11 Ontology formalization for ‘Development And Impact Of Infrastructure Investment And Service Supported Indicator’ class

5.2.3.2. Ontology for ‘Significant Indirect Economic Impact Including Extent Of Impact Indicator’ class / EC8

The additional impacts that are generated by an organization through the economy in terms of financial flow are included in this indicator. It has indirect impacts as a participant or agent in socio-economic change, and in developing economies in terms of local communities and regional economies (Global Reporting Initiative 2013b, 80). So, this indicator has significant positive and negative indirect economic impacts on ‘Local Community and Regional Economy’ class as depicted in Figure 5.12.

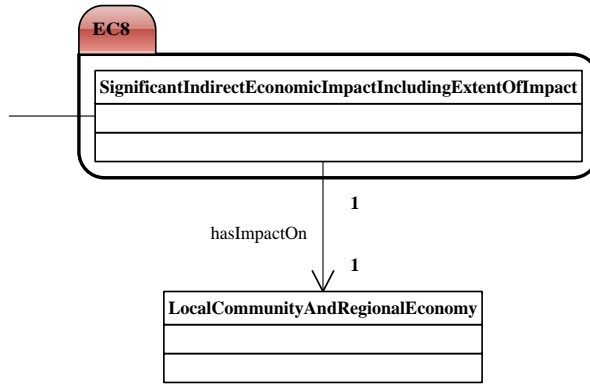


Figure 5.12 Ontology formalization for ‘Significant Indirect Economic Impact Including Extent Of Impact Indicator’ class

5.2.4. Ontology for ‘Procurement Practice Aspect’ class

This is the final Aspect, the essence of which is “spending on local suppliers” (English and K.Schooley 2014). There are generic and specific DMA classes associated with this Aspect and one Indicator as shown in Figure 5.13.

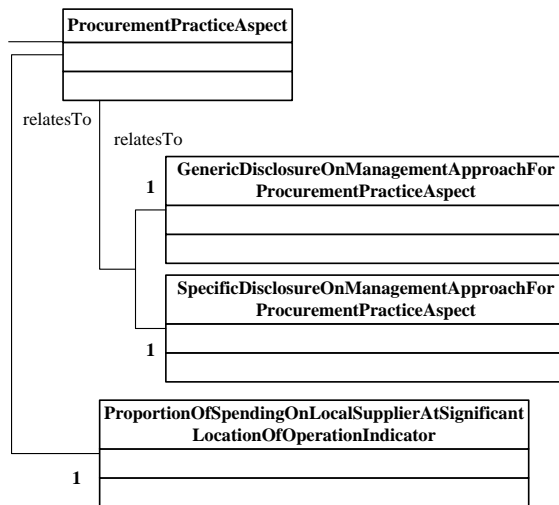


Figure 5.13 Ontology formalization for ‘Procurement Practice Aspect’ class

5.2.4.1. Ontology for ‘Proportion Of Spending On Local Supplier At Significant Location Of Operation indicator’ class/ EC9

This indicator concentrates on ratio of local spending at significant locations of operation. The concept that relates to this indicator is ‘Percentage of Procurement Budget Spent On Local Supplier’ which is used for the class ‘Location of Operation’ (Global Reporting Initiative 2013b, 83) as presented in Figure 5.14. The data properties can be found in Tables 8.85 to 8.86.



Figure 5.14 Ontology formalization for 'Proportion Of Spending On Local Suppliers At Significant Location Of Operation indicator' class

5.3. Summary

This chapter has explained the ontology for the 'Economic Aspect' class for nine indicators that are related to each Aspect. The next chapter describes the ontology for the 'Environmental Category' class.

Chapter 6. Ontology for environmental category class

6.1. Introduction

This category concentrates on the “environmental organization’s impacts on living and non-living natural systems, which include land, air, water, and ecosystems” (Global Reporting Initiative 2013b, 84). GRI G4 categorized this category class according to twelve Aspects. In this chapter, the ontologies for twelve Aspects are explained, focusing on the ontology for environmental performance indicators. The summary is in section (6.3).

6.2. Ontology for ‘Environmental Aspect’ class

There are twelve Aspects as classes in the ‘Environmental Category’ class as presented in Figure 6.1. These are: ‘Material’ class; ‘Energy’ class; ‘Water’ class; ‘Biodiversity’ class; ‘Emission’ class; ‘Effluent and Waste’ class; ‘Product and Service’ class; ‘Compliance’ class; ‘Transport’ class; ‘Overall’ class; ‘Supplier Environmental Assessment’ class; ‘Environmental Grievance Mechanism’ class. The following subsection explains the ontology of each indicator for each Aspect.

6.2.1. Ontology for ‘Material Aspect’ class

This is the first Aspect that belongs to the ‘Environmental Aspect’ class. It emphasizes “materials used” (English and K.Schooley 2014). This Aspect addressed the weight and volume of materials used and the percentage of recycled input materials used to manufacture primary products and services for any organization. Figure 6.2 displays generic DMA for this Aspect and the two indicators EN1 and EN2 are included.

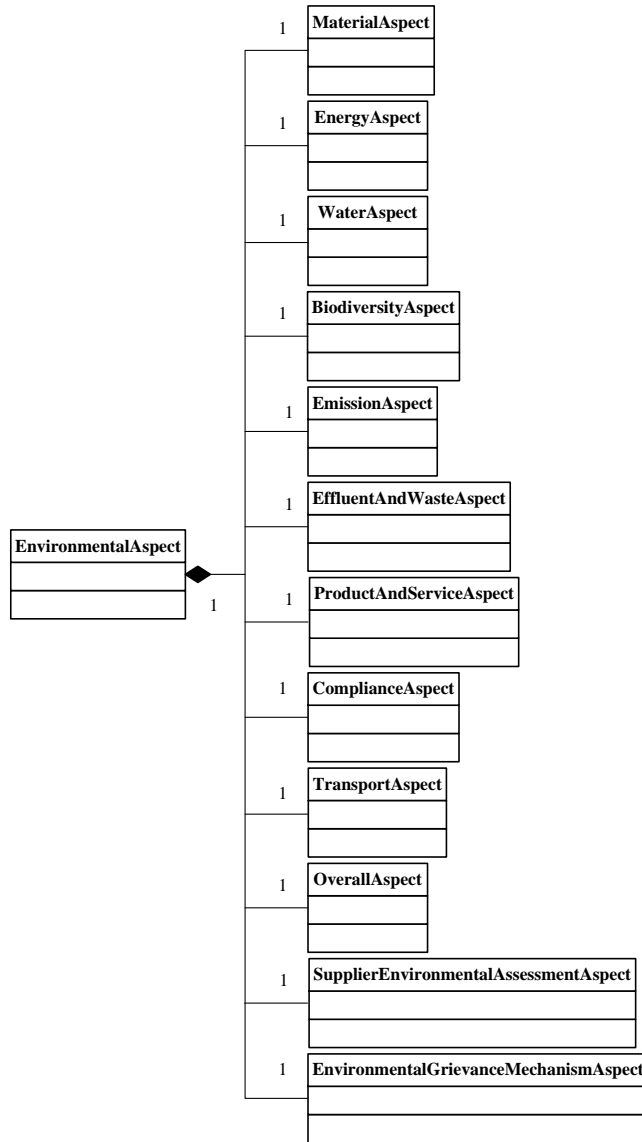


Figure 6.1 Ontology formalization for 'Environmental Aspect' class

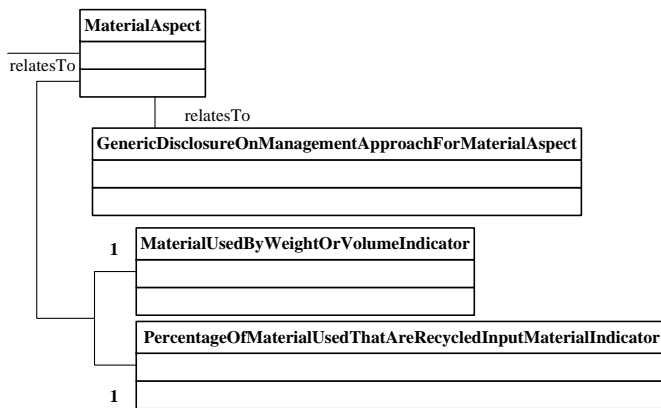


Figure 6.2 Ontology formalization for 'Material Aspect' class

In the following subsection, the ontology for the two indicators of the class ‘Material Aspect’ is explained.

6.2.1.1. Ontology for ‘Material Used By Weight Or Volume Indicator’ class/ EN1

It refers this indicator to weight or volume of material used to produce and package the primary products and services. The principal concept in this indicator is the ‘Material Used’ class which is used to produce and offer the ‘Primary Product and Service’ class in the ‘Reporting Period’ (Global Reporting Initiative 2013b, 86) as shown in Figure 6.3. The data properties can be found in Table 8.87.

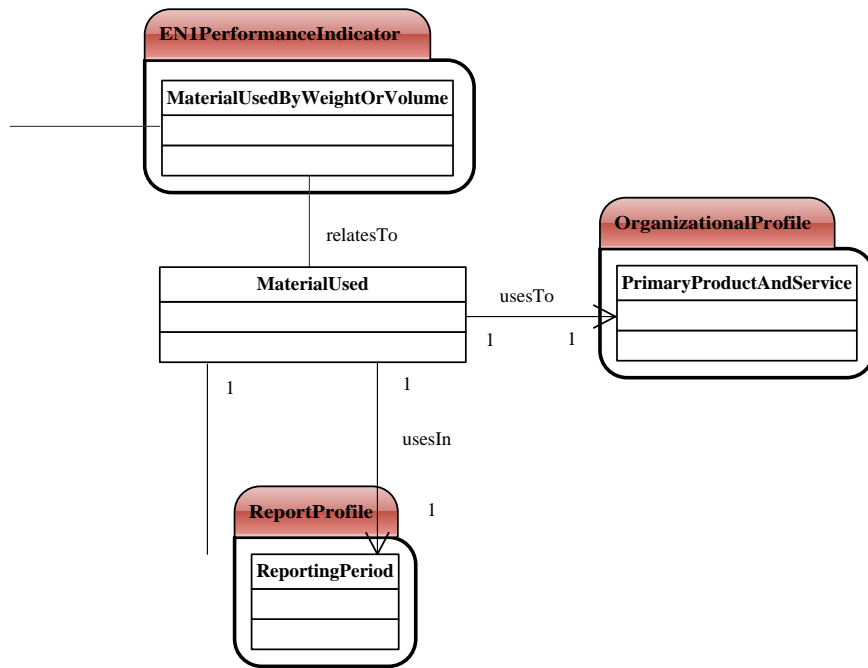


Figure 6.3 Ontology formalization for ‘Material Used By Weight Or Volume Indicator’ class

6.2.1.2. Ontology for ‘Percentage Of Material Used That Is Recycled Input Material Indicator’ class/ EN2

The essence of this indicator is the recycled input of materials used to produce the organization’s primary goods and services. This indicator reflects the organization’s ability to use recycled input materials. To calculate this percentage, it should identify two variables or concepts which are the ‘Material Used’ class as stated in EN1 indicator and the ‘Recycled Input Material Used’ class. So, the class ‘Material Used’ is a Denominator Of the class ‘Recycled Input Material Used’ which is used to calculate the class ‘Percentage Of Recycled Input Material Used’ (Global Reporting Initiative 2013b, 87) as presented in Figure 6.4. The data properties can be found in Table 8.88 and Table 8.89.

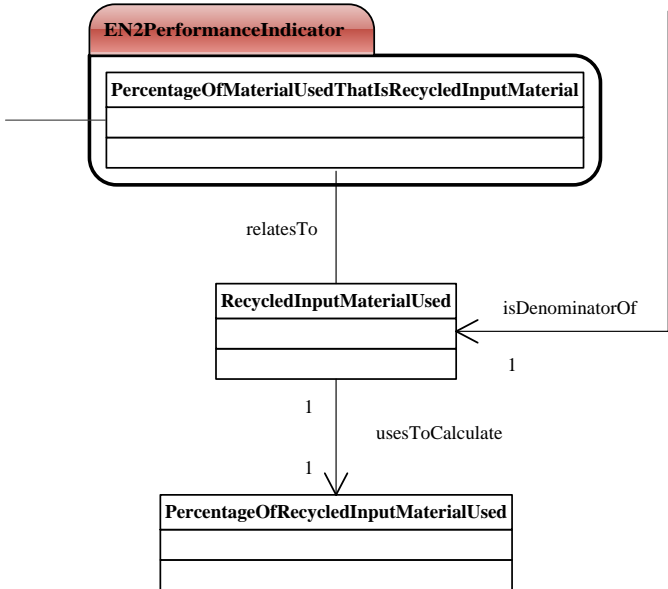


Figure 6.4 Ontology formalization for ‘Percentage Of Material Used That Is Recycled Input Material Indicator’ class

6.2.2. Ontology for ‘Energy Aspect’ class

This is the second Aspect that relates to ‘Environmental Aspect’ class. It focuses on “energy consumed” (English and K.Schooley 2014). There are generic and specific DMAs for the Energy Aspect. In addition, there are five indicators that are linked to this Aspect EN3 to EN7 as shown in Figure 6.5.

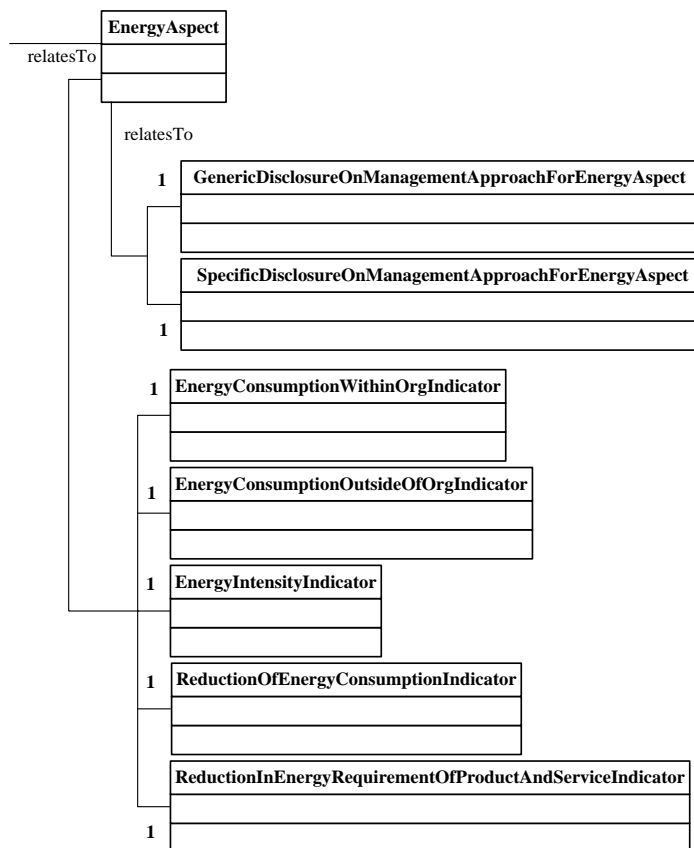


Figure 6.5 Ontology formalization for ‘Energy Aspect’ class

6.2.2.1. Ontology for ‘Energy Consumption Within Org Indicator’ class/ EN3

It is required to report the total energy consumption within an organization in joules or multiples depending on the energy type and source. The classes that are related to this indicator class are ‘Energy Consumption’, ‘Non Renewable Fuel Consumed’ class, ‘Renewable Fuel Consumed’ class, and ‘Electricity Heating Cooling and Steam Consumption’ class are types of energy. The source of the super class ‘Non Renewable Fuel Consumed’ is sub-class ‘Non Renewable Fuel Purchased’ and Non Renewable Fuel Generated By Org’ sub-class. Likewise, the source of the super-class ‘Renewable Fuel Consumed’ is the sub-class ‘Renewable Fuel Purchased’ and the sub-class ‘Renewable Fuel Generated By Org’’. The third type of energy is ‘Electricity Heating Cooling and Steam Consumption’ class. This type of energy consumption requires dividing the super class into sub-classes which are: ‘Electricity Consumption’ class, ‘Heating Consumption’ class, ‘Cooling Consumption’ class and ‘Steam Consumption’ class are shown in Figure 6.6 (a) that displays the upper section of this indicator class.

In addition, other classes need to be identified that are related to ‘Electricity Heating Cooling and Steam Consumption’ class to enable calculation of the total energy consumption within the organization for this type of energy. They are ‘Electricity Heating Cooling and Steam Purchased For Consumption’ class, ‘Self-Generated Electricity Heating Cooling and Steam’ class, and ‘Electricity Heating Cooling and Steam Sold’ class. For ‘Self-Generated Electricity Heating Cooling and Steam’ class is a super class for the following sub-classes: ‘Self-Generated Electricity’, ‘Self-Generated Heating’, ‘Self-Generated Cooling’, and ‘Self-Generated Steam’. Besides, the super class ‘Electricity Heating Cooling and Steam Sold’ needs to be split into the following sub-classes: ‘Electricity Sold’, ‘Heating Sold’, ‘Cooling Sold’, and ‘Steam Sold’. Moreover, the ‘Standard Used’ class, the ‘Methodology Used’ class and ‘Assumption Used’ class are related to this indicator to compute energy consumption. Furthermore, the ‘Source Of Conversion Factor Used’ class is required, whether local or generic (Global Reporting Initiative 2013b, 89-90). It should be noted that the relationship between super class and sub-classes is an inheritance one because the sub-classes have inherited the data type properties of the super-classes. Figure 6.6 (b) represents ontology for the lower section of this indicator class. The data properties can be found in Tables 8.90 to 8.92.

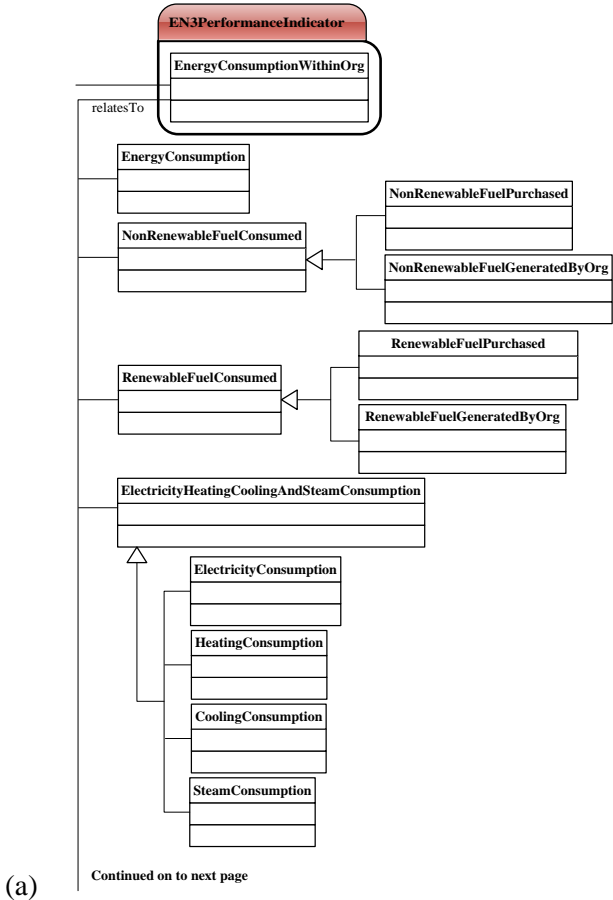
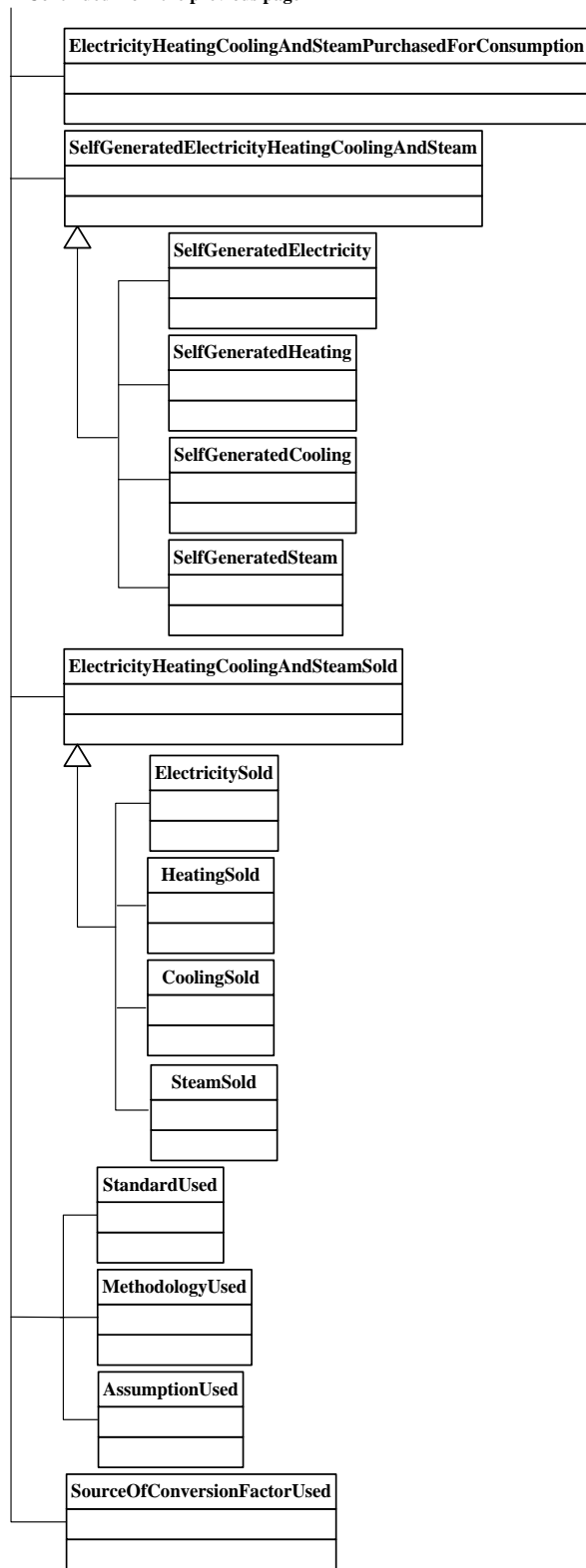


Figure 6.6 Ontology formalization for ‘Energy Consumption Within Org Indicator’ class

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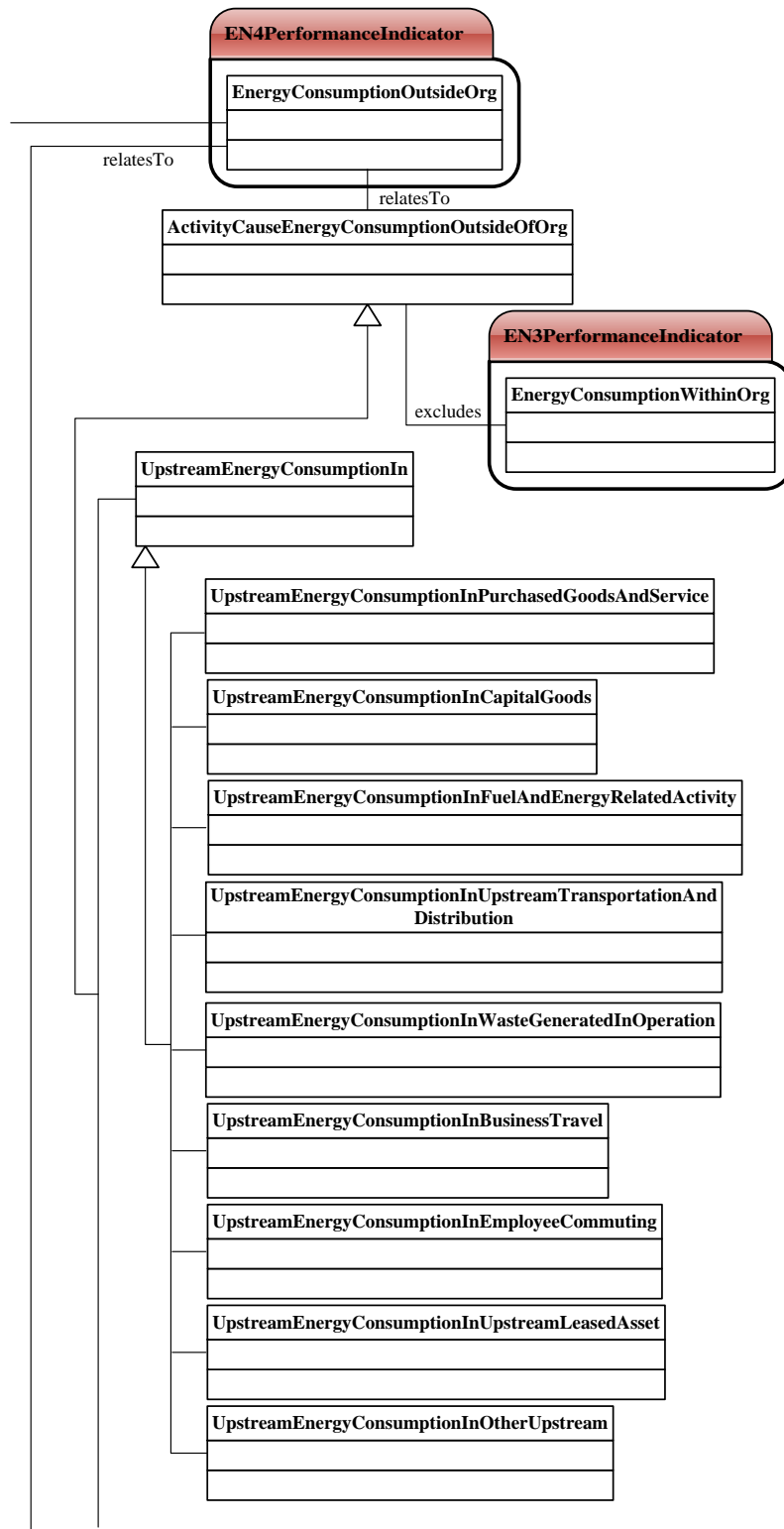


(b)

Figure 6.6 (cont) Ontology formalization for 'Energy Consumption Within Org Indicator' class

6.2.2.2. Ontology for 'Energy Consumption Outside Of Org Indicator' class/ EN4

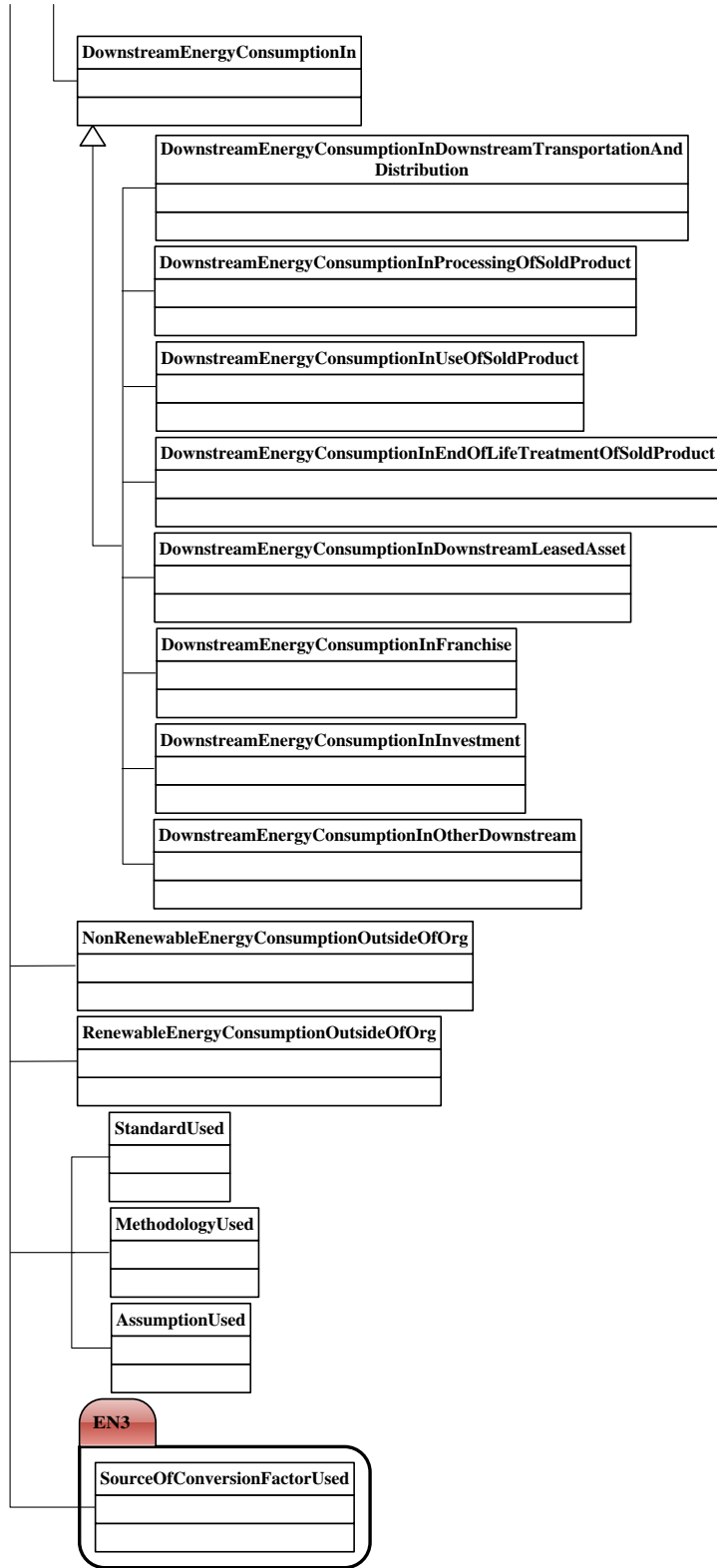
It concerns energy consumed outside the organization. The main class that is related to this indicator class is 'Activity Cause Energy Consumption Outside Of Org' to measure energy consumption outside of organization. This indicator class excludes energy consumption as stated in indicator class EN3. In addition, there are sub-classes by relevant 'Upstream Energy Consumption' class or 'Downstream Energy Consumption' class of the super class of this indicator class which inherit the data properties of the super class. Both sub-classes are classes for the main class according to activity as shown in Figure 6.7(a) and (b). Moreover, the other classes that are related to this indicator class are sources of energy consumed outside the organization; these may be split into: 'Non Renewable Energy Consumption Outside Of Org' class, and 'Renewable Energy Consumption Outside Of Org' class. Furthermore, the class 'Standard Used', 'Methodology Used' class and 'Assumption Used' class which are needed to calculate and measure energy consumption are related to this indicator class. Finally, the 'Source Of Conversion Factor Used' class is required to apply conversion factors under this indicator (Global Reporting Initiative 2013b, 91-92) as shown in Figure 6.7(b) (lower section of this indicator).



(a) Continued on to next page

Figure 6.7 Ontology formalization for 'Energy Consumption Outside Of Org Indicator' class)

Continued from the previous page



(b)

Figure 6.7 (cont) Ontology formalization for 'Energy Consumption Outside Of Org Indicator' class)

6.2.2.3. Ontology for ‘Energy Intensity Indicator’ class/ EN5

It describes an organization’s energy intensity ratio consumption. The class that is related to this indicator class is the ‘Energy Intensity Ratio’ class. The latest class is calculated by dividing ‘Absolute Energy Consumption’ class (as the numerator) by ‘Org Specific Metric’ class (as the denominator). The ‘Absolute Energy Consumption’ class includes ‘Energy Consumption Within Org’ class; ‘Energy Consumption Outside Of Org’ class; and ‘Energy For Both Org Consumption’ class. The ‘Energy Intensity Ratio’ categories for types of energy consumption are: ‘Energy Intensity Ratio for Consumption Within Org’, ‘Energy Intensity Ratio For Consumption Outside Org’, and ‘Energy Intensity Ratio For Both Org Consumption’. The other type of ‘Energy Intensity Ratio’ categories according to types of energy are: ‘Energy Intensity Ratio For Fuel’ class, ‘Energy Intensity Ratio For Electricity’ class, ‘Energy Intensity Ratio For Heating’ class, ‘Energy Intensity Ratio For Cooling’ class, ‘Energy Intensity Ratio For Steam’ and ‘Energy Intensity Ratio For All Energy Consumption’ class (Global Reporting Initiative 2013b, 93). The ontology for this indicator is shown in Figure 6.8.

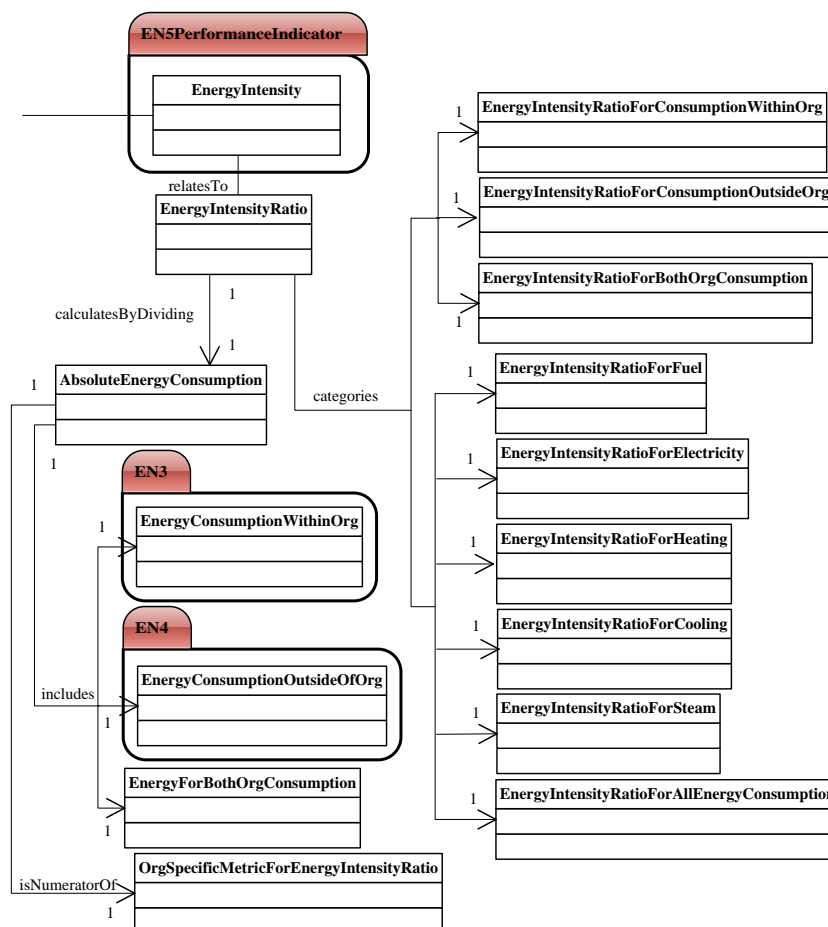


Figure 6.8 Ontology formalization for ‘Energy Intensity Indicator’ class

6.2.2.4. Ontology for 'Reduction Of Energy Consumption Indicator' class/ EN6

It represents the amount of reductions in energy consumption. The class that is related to this indicator class is 'Energy Saved By Initiative'. It includes four types of classes of Initiatives which are: 'Process Redesign Initiative', 'Conversion and Retrofitting Of Equipment Initiative', 'Conversion and Retrofitting Of Equipment Initiative' and 'Operational Change Initiative'. The relationship between the super-class 'Energy Saved By Initiative' and the sub-classes by types of energy included in the reductions is inheritance which are 'Energy Saved By Initiative For Fuel', 'Energy Saved By Initiative For Electricity', 'Energy Saved By Initiative For Heating', 'Energy Saved By Initiative For Cooling', and 'Energy Saved By Initiative For Steam'. In addition, the class 'Basis For Calculating Reduction In Energy Consumption' is also related to this indicator class. Moreover, 'Standard Used' class, 'Methodology Used' class and 'Assumption Used' class are related to this indicator class. It should be noted that the class 'Reduction Energy Consumption From Production Capacity Or Outsourcing' class excludes the 'Energy Saved By Initiative' class (Global Reporting Initiative 2013b, 94) as presented in Figure 6.9. The data properties can be found in Table 8.93.

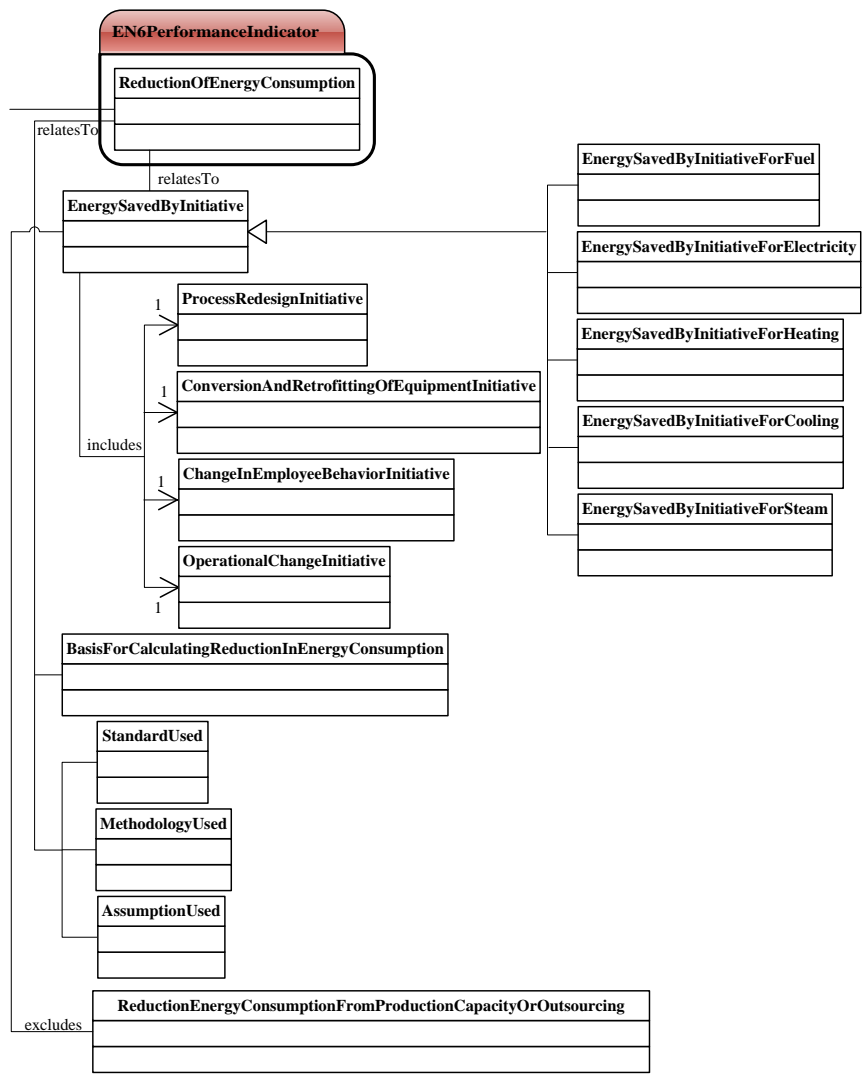


Figure 6.9 Ontology formalization for 'Reduction Of Energy Consumption Indicator' class

6.2.2.5. Ontology for 'Reduction In Energy Requirement Of Product and Service Indicator' class/ EN7

It signifies the reductions in the energy requirements of sold products and services achieved. The classes that are related to this indicator class are: 'Reduction In Energy Requirement'; 'Calculation Basis For Reduction In Energy Consumption'; 'Standard Used', 'Methodology Used', and 'Assumption Used'. It is required to report the 'Reduction In Energy Requirement' class which results from the 'Sold Service' class and 'Sold Product' class in the 'Reporting Period' class. In addition, the other class that is related to this indicator class is 'Calculation Basis For Reduction In Energy Consumption' as a basis to calculate this reduction. Besides, it is required to report for 'Standard Used' class, 'Methodology Used' class, and 'Assumption Used' class (Global Reporting Initiative 2013b, 95) as displays in Figure 6.10. The data properties can be found in Table 8.94 and Table 8.95.

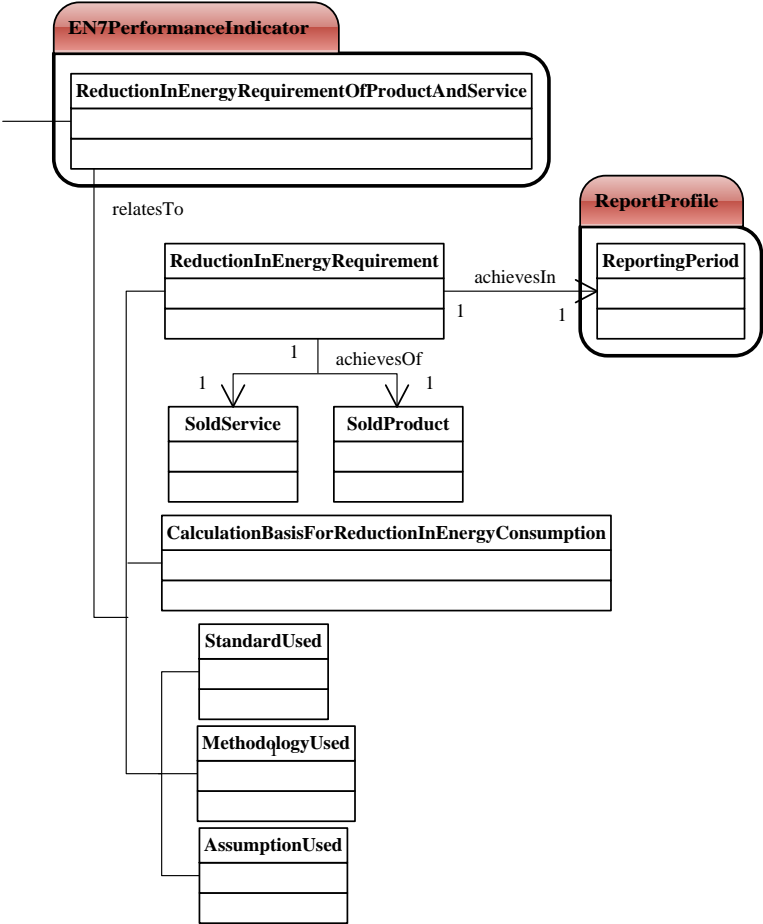


Figure 6.10 Ontology formalization for 'Reduction In Energy Requirement Of Product And Service Indicator' class

6.2.3. Ontology for ‘Water Aspect’ class

This is the third Aspect that links to ‘Environmental Aspect’ class. It is focussed on “water withdrawal by source” (English and K.Schooley 2014). There are generic DMAs and three indicators EN8 to EN10 belong to this Aspect as displayed in Figure 6.11.

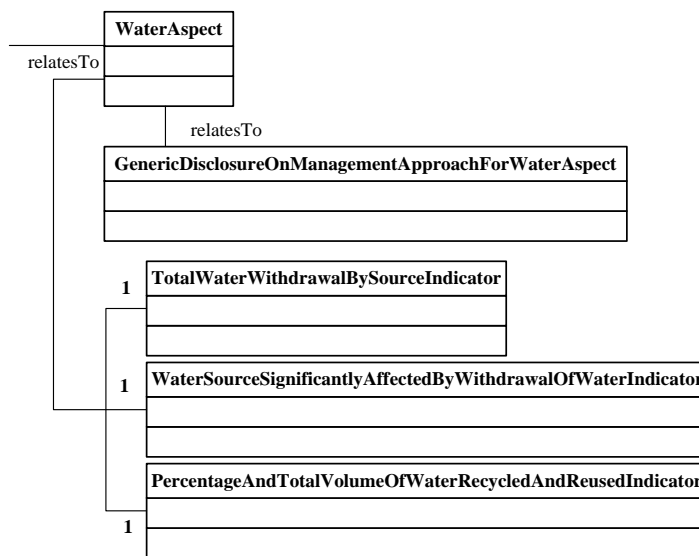


Figure 6.11 Ontology formalization for ‘Water Aspect’ class

The following subsection is specified to define ontology for ‘Water Aspect’ class.

6.2.3.1. Ontology for ‘Total Water Withdrawal By Source Indicator’ class/ EN8

It refers to volume of water withdrawal from different sources. The class that is related to this indicator class is ‘Water Withdrawal’. The total volume of water withdrawn from a water source is required. GRI G4 referred to many water source types. So, the super class ‘Water Withdrawal’ has the following as sub-classes by source type: ‘Water Withdrawal By Surface Water Source’ class, ‘Water Withdrawal By Ground Water Source’ class, ‘Water Withdrawal By Rainwater Collected Directly and Stored By Org Source’ class, ‘Water Withdrawal By Waste Water From Another Org Source’ class, and ‘Water Withdrawal By Municipal Water Supply Or Other Water Utility Source’ class and they inherit the data property. In addition, the class ‘Standard Used’ class, ‘Methodology Used’ class, and ‘Assumption Used’ class is related to this indicator to calculate the volume of water withdrawal based on estimation or actual measurement (Global Reporting Initiative 2013b, 97) as shown in Figure 6.12. The data properties can be found in Table 8.96 to Table 8.102.

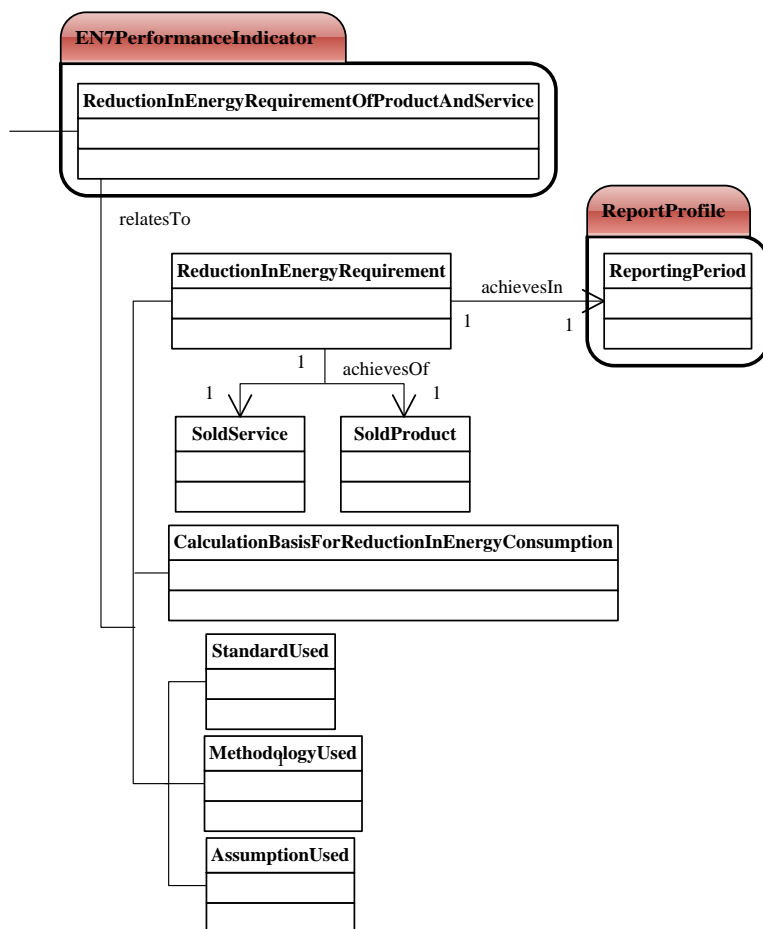


Figure 6.12 Ontology formalization for 'Total Water Withdrawal By Source Indicator' class

6.2.3.2. Ontology for 'Water Source Significantly Affected by Withdrawal of Water Indicator' class/ EN9

It refers to the significant impact of water withdrawal on water source by type. The essence of this indicator class is the 'Water Source Affected' class which is affected by 'Water Withdrawal' class by type. The former class is withdrawn by the class 'Organization'. The super-class 'Water Source Affected' has subclasses which are: 'Surface Water Source' class, 'Ground Water Source' class, 'Rainwater Collected Directly and Stored By Org Source' class, 'Waste Water From Another Org Water Source' class, and 'Municipal Water Supply Or Other Water Utility Source' class and they inherit the data properties. In addition, the class 'Standard Used' class, Methodology Used' class, and 'Assumption Used' are related to this indicator class to measure the total number of water sources significantly affected by withdrawal of water by type (Global Reporting Initiative 2013b, 98) as shown in Figure 6.13. The data properties can be found in Table 8.103 and Table 8.104.

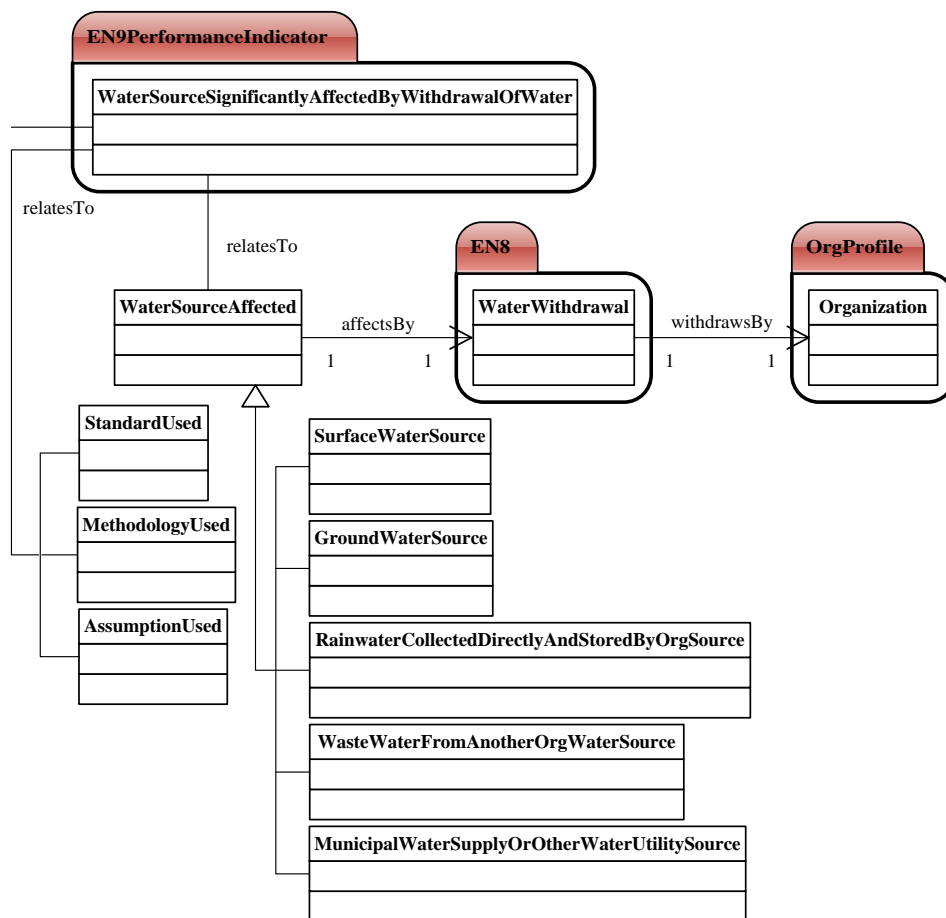


Figure 6.13 Ontology formalization for 'Water Source Significantly Affected By Withdrawal Of Water Indicator' class

6.2.3.3. Ontology for 'Percentage And Total Volume Of Water Recycled And Reused Indicator' class/ EN10

It describes water recycled and reused by the organization. The class 'Water Recycled and Reused' is related to this indicator class. The 'Water Recycled and Reused' class is recycled and used by the 'Organization' class. To find 'Percentage Of Water Recycled and Reused' class, the total volume of 'Water Recycled and Reused' class is a numerator of the class 'Water Withdrawal'. In addition, 'Standard Used' class, 'Methodology Used' class, and the 'Assumption Used' class is also related to this indicator (Global Reporting Initiative 2013b, 99) as displayed in Figure 6.14. The data properties can be found in Table 8.105 to Table 8.107.

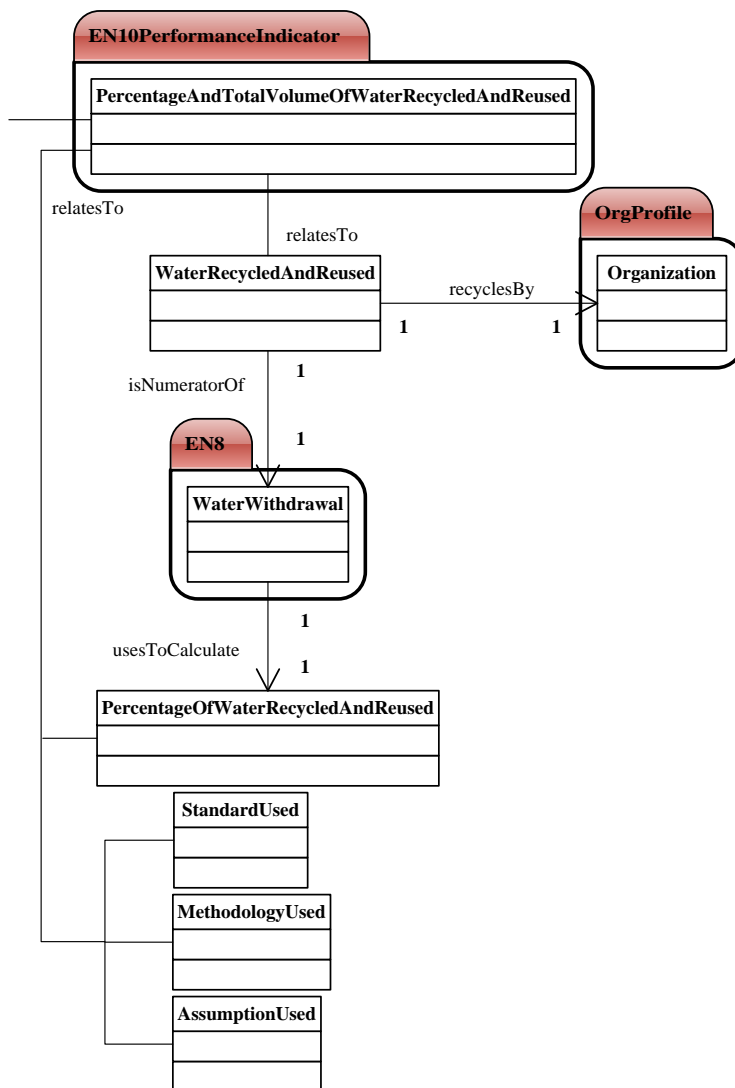


Figure 6.14 Ontology formalization for ‘Percentage And Total Volume Of Water Recycled And Reused Indicator’ class

6.2.4. Ontology for ‘Biodiversity Aspect’ class

This Aspect class is the fourth that relates to the ‘Environmental Aspect’ class. The essence of this Aspect is “operational sites adjacent to protected areas” (English and K.Schooley 2014). There are generic and specific DMAs and four indicators EN11 to EN14 as shown in Figure 6.15.

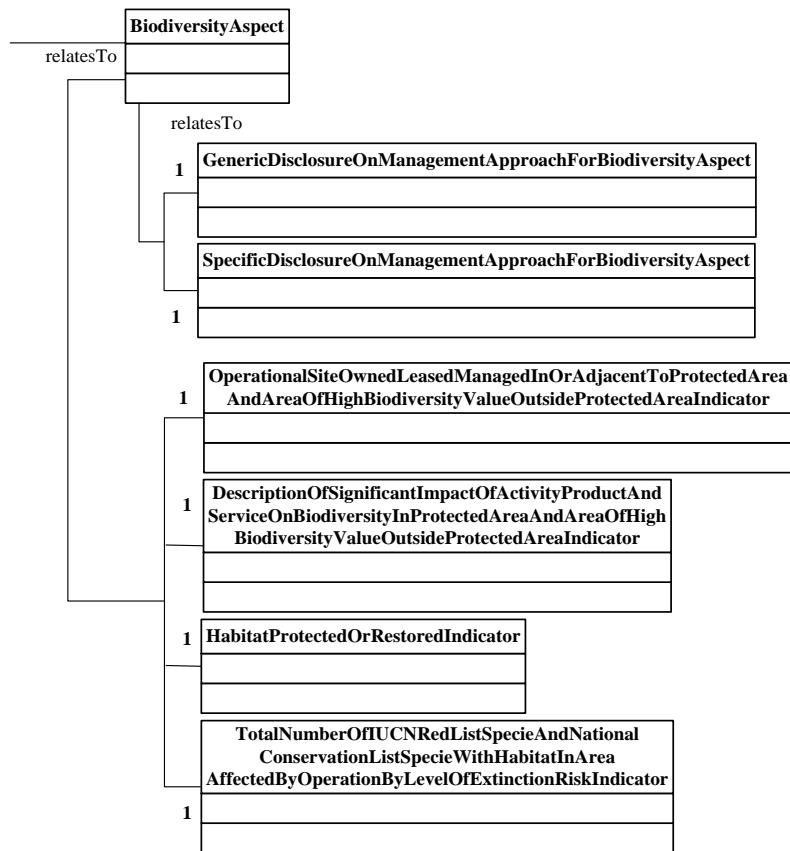


Figure 6.15 Ontology formalization for ‘Biodiversity Aspect’ class

In the following subsection, the ontology for the fourth indicators of the class ‘Biodiversity Aspect’ is explained.

6.2.4.1. Ontology for ‘Operational Site Owned Leased Managed In Or Adjacent To Protected Area And Area Of High Biodiversity Value Outside Protected Area Indicator’ class/ EN11

It relates to operation site and areas of high biodiversity value outside protected areas. The class that is related to this indicator class is ‘Operational Site’. The data property that is required for this super-class is inherited by the sub-classes which are: ‘Operational Site Owned’ class, ‘Operational Site Leased’ class, ‘Operational Site Managed In’ class, ‘Operational Site Adjacent To’ class, ‘Operational Site That Contain Protected Area’ class, ‘Operational Site Area Of High Biodiversity Value Outside Protected Area’ class, and ‘Operation Site For Future Operation Announced Formally’ class (Global Reporting Initiative 2013b, 101) as presented in Figure 6.16. The data properties can be found in Table 8.108 to Table 8.111.

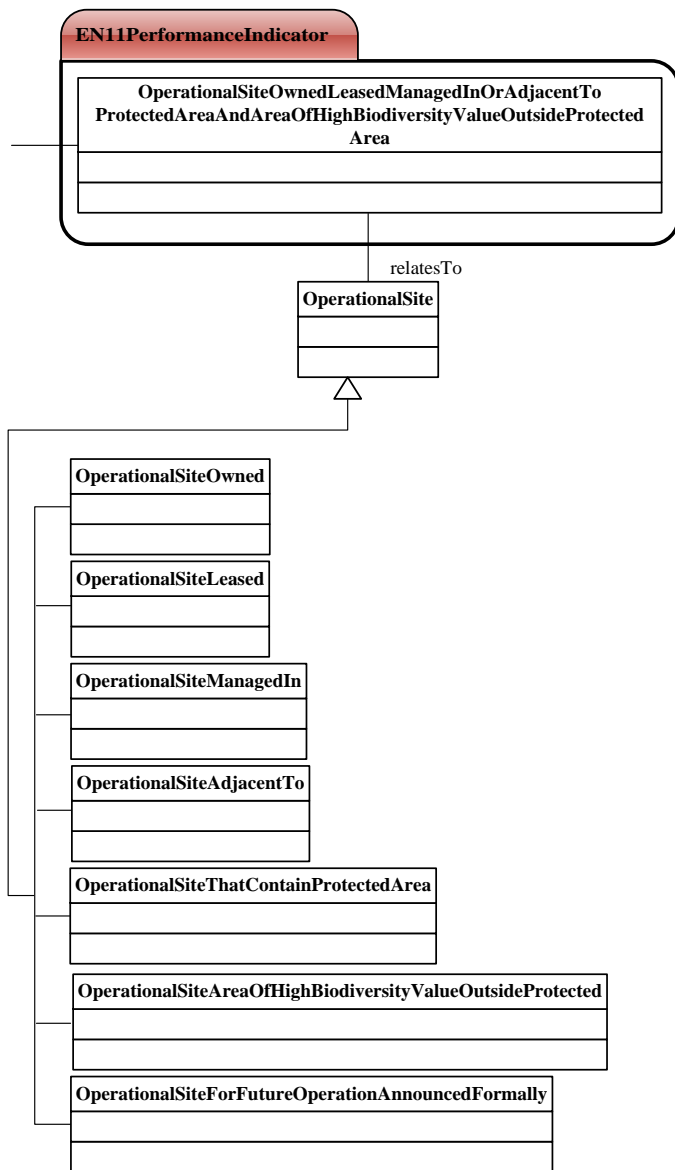


Figure 6.16 Ontology formalization for 'Operational Site Owned Leased Managed In Or Adjacent To Protected Area And Area Of High Biodiversity Value Outside Protected Area Indicator' class

6.2.4.2. Ontology for ‘Description Of Significant Impact Of Activity Product and Service On Biodiversity In Protected Area And Area Of High Biodiversity Value Outside Protected Area Indicator’ class/ EN12

It describes the important impacts of activities, products, and services on biodiversity in and out protected areas. The class ‘Impact On Biodiversity’ is the basic class that is related to this indicator class which is associated with the ‘Activity Product Service’ class. The ‘Activity Product Service’ class is produced by the ‘Organization’ class (Global Reporting Initiative 2013b, 102) as shown in Figure 6.17. The data properties can be found in Table 8.112 and Table 8.113.

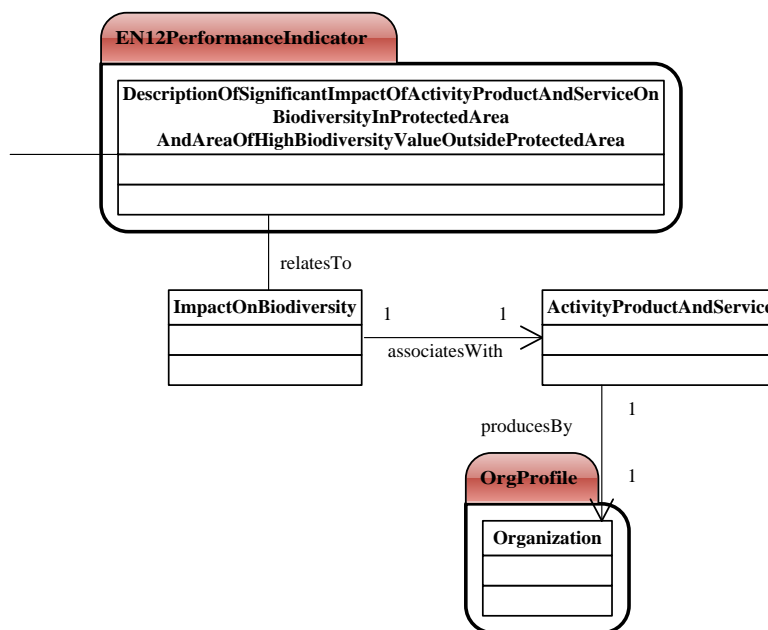


Figure 6.17 Ontology formalization for ‘Description Of Significant Impact Of Activity Product And Service On Biodiversity In Protected Area And Area Of High Biodiversity Value Outside Protected Area Indicator’ class

6.2.4.3. Ontology for ‘Habitat Protected Or Restored Indicator’ class/ EN13

It represents all habitat sheltered and re-established. Four classes are related to this indicator class: ‘All Habitat Protected Area Or Restored Area’ class, ‘Standard Used’ class, ‘Methodology Used’ class, and ‘Assumption Used’ class (Global Reporting Initiative 2013b, 103) as revealed in Figure 6.18. The data properties can be found in Table 8.114.

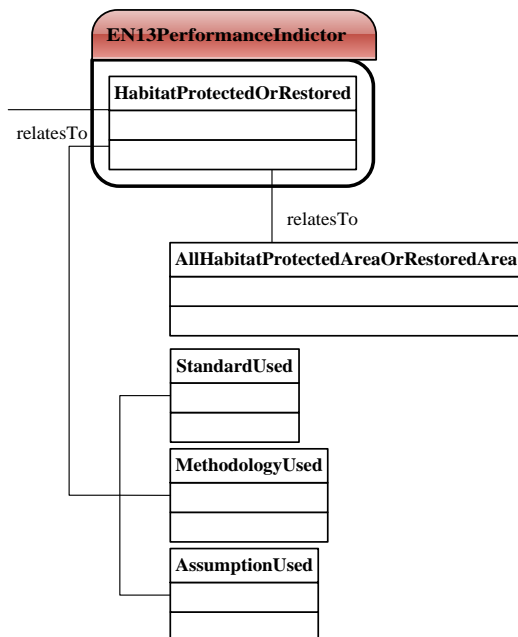


Figure 6.18 Ontology formalization for ‘Habitat Protected Or Restored Indicator’ class

6.2.4.4. Ontology for ‘Total Number Of IUCN Red List Specie and National Conservation List Specie With Habitat In Area Affected By Operation By Level Of Extinction Risk Indicator’ class/ EN 14

It refers to International Union for Conservation Of Nature And Natural Resources IUCN red list species in areas affected by organization operation’s for each extinction risk category. The class that is related to this indicator class is ‘Habitat’ class which is an element of ‘All Habitat Protected Area Or Restored Area’ class. The class ‘Habitat’ is affected by an ‘Operation Site’ class. The class ‘Organization’ has an ‘Operation Site’ class. The ‘Habitat’ class includes the ‘Specie’ class. The total number of species on the international and national conservation list, and the level of extinction risk, is required as a datatype property of the ‘Specie’ class. The sub-classes ‘Specie On IUCN Red List Of Threatened Specie’ class and ‘Specie On National Conservation Or Regional Conservation List’ class have inherited the datatype property of the super-class ‘Specie’ class (Global Reporting Initiative 2013b, 104) as presented in Figure 6.19. The data properties can be found in Table 8.115 to Table 8.117.

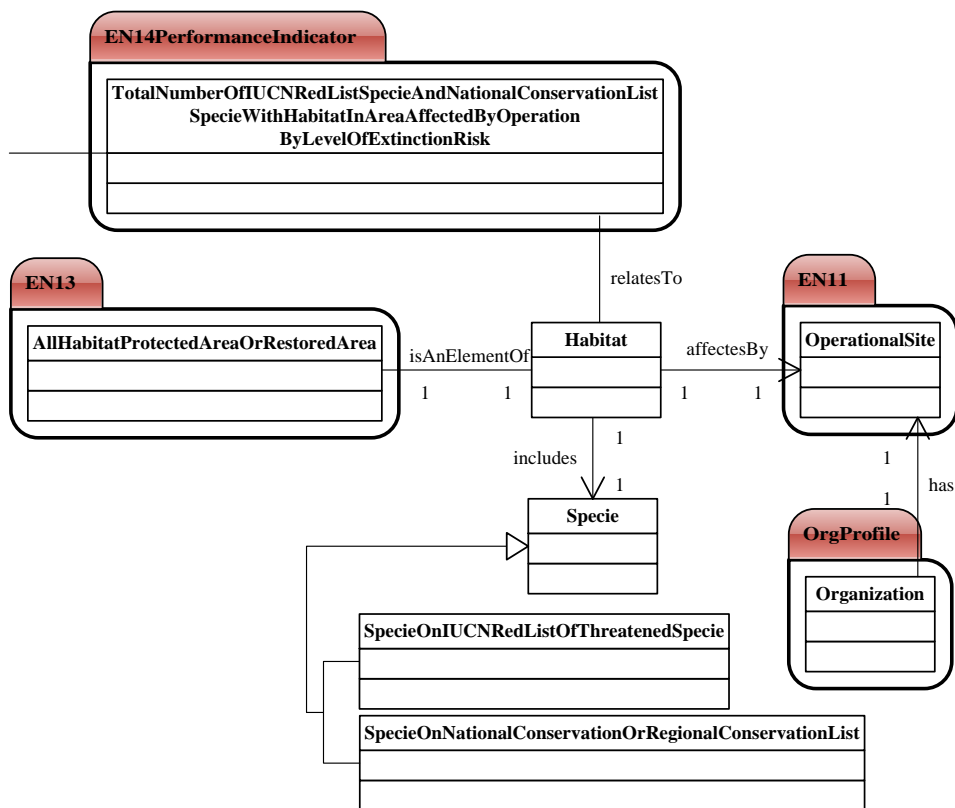


Figure 6.19 Ontology formalization for ‘Total Number Of IUCN Red List Specie And National Conservation List Specie With Habitat In Area Affected By Operation By Level Of Extinction Risk Indicator’ class

6.2.5. Ontology for ‘Emission Aspect’ class

This is the fifth Aspect that links to the ‘Environmental Aspect’ class. It focuses on “direct greenhouse gas (GHG) emissions” (English and K.Schooley 2014). There are generic and specific DMAs and seven indicator classes EN15 to EN21 as shown in Figure 6.20.

In the following subsection, the ontology for the seventh indicators of the class ‘Emission Aspect’ is explained.

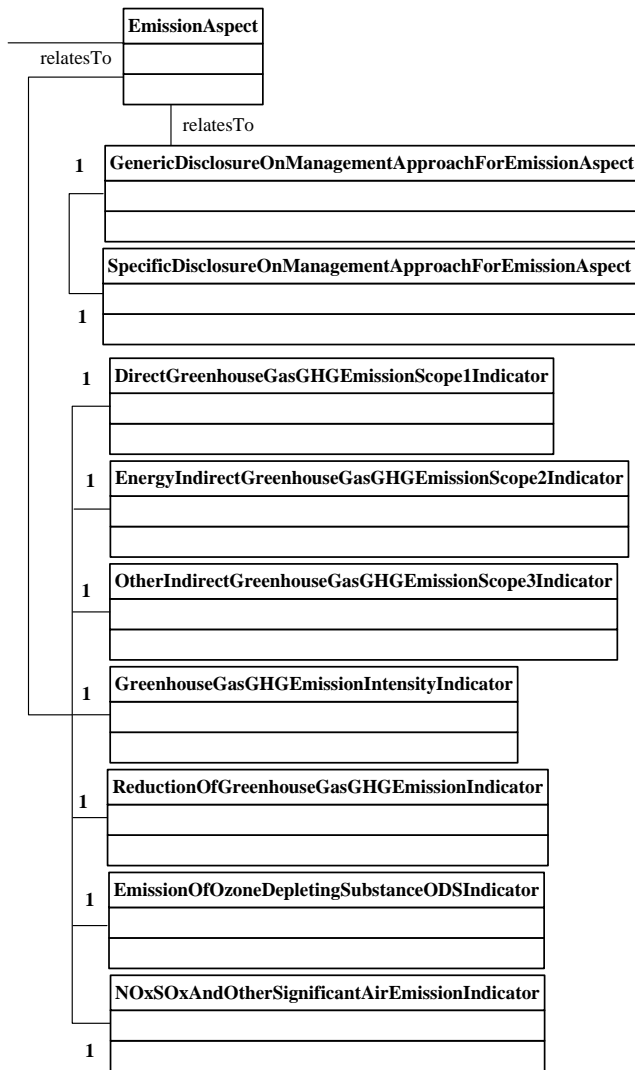


Figure 6.20 Ontology formalization for 'Emission Aspect' class

6.2.5.1. Ontology for 'Direct Greenhouse Gas GHG Emission Scope1 Indicator' class/EN15

It identifies direct emissions of GHGs from sources owned by organization. The classes that relate to this indicator class are: 'Gross Direct GHG Emission Scope1' class, 'Chosen Baseline' class, 'Standard Used' class, 'Methodology Used' class, 'Assumption Used' class, 'Biogenic CO₂ Emission Separately From Gross Direct Greenhouse Gas GHG Emission Scope1' class, 'Source Of Emission Factor Used and Global Warming Potential GWP Rate Or reference To GWP Source' class, 'Chosen Consolidation Approach For Emission' class. GRI G4 listed four sources of direct emission of GHGs which are owned or controlled by the 'Organization' class. The fourth sources of classes are: 'Generation Of Electricity Heating Cooling and Steam' class, 'Physical Or Chemical Processing' class, 'Transportation Of Material Product Waste Employee and Passenger' class, and 'Fugitive Emission' class. The fourth sources classes as sub-classes have inherited the datatype property of the super-class 'Gross Direct GHG Emission Scope1' by calculating the gross direct GHG emissions using relevant Global Warming Potential (GWP) rates, in CO₂ equivalents, including the calculation of gases (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, and NF₃) in the 'Reporting Period' class. In addition, the super-class excludes the class 'GHG Trade'. However, it is required to distinguish the emission class for 'Biogenic CO₂ Emission' class from the class 'Gross Direct GHG Emission Scope1'. Besides, the class 'Chosen Baseline' is needed. Moreover, the 'Standard Used' class, 'Methodology Used', class, and 'Assumption Used' class is needed to clarify the Model used, the approach and hypothesis adopted to measure the direct emission of GHG Scope1. Furthermore, the class that states 'Source Of Emission Factor Used and Global Warming Potential GWP Rate Or Reference To GWP Source' to refer to the GWP source. Finally, the organization should select a consistent consolidation approach for emission as a basis to measure the gross direct GHG emissions Scope 1 through the class 'Chosen Consolidation Approach For Emission'. It should indicate that this indicator class results from 'Non Renewable Fuel Consumed' class that belongs to EN3 (Global Reporting Initiative 2013b, 107-109) as shown in Figure 6.21. The data properties can be found in Table 8.118 to 8.120.

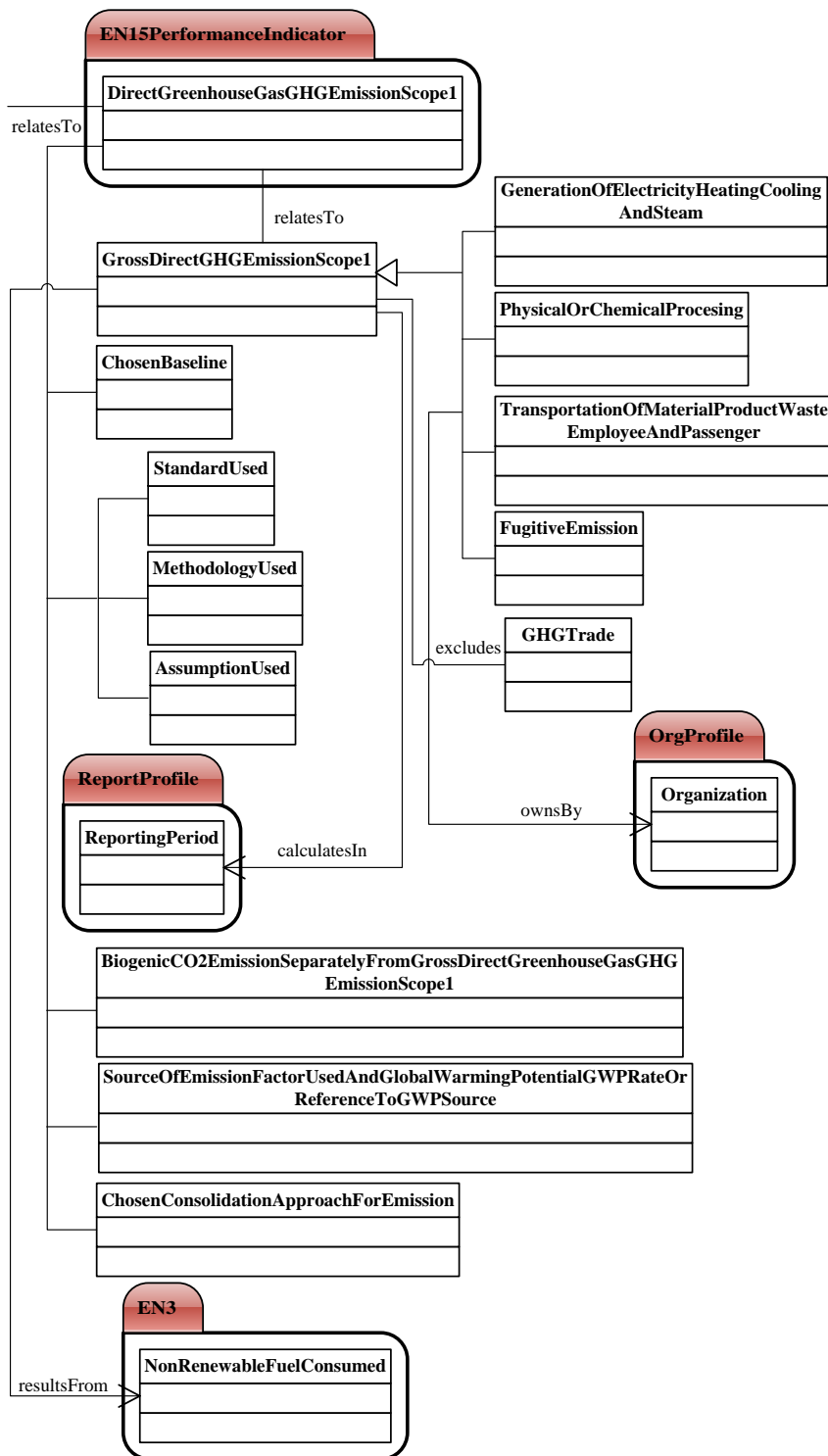


Figure 6.21 Ontology formalization for 'Direct Greenhouse Gas GHG Emission Scope1 Indicator' class

6.2.5.2. Ontology for 'Energy Indirect Greenhouse Gas GHG Emission Scope2 Indicator' class/ EN16

It identifies indirect emissions of GHGs that produces from electricity, heating, cooling, and steam owned to be consumed by the organization. The classes that relate to this indicator class are: 'Gross Energy Indirect GHG Emission Scope2' class, 'Chosen Baseline' class, 'Standard Used' class, 'Methodology Used', 'Assumption Used', 'Source Of Emission Factor Used and Global Warming Potential GWP Rate Or Reference To GWP Source', and 'Chosen Consolidation Approach For Emission' class. Firstly, the class 'Gross Energy Indirect GHG Emission Scope2' that results from 'Electricity Heating Cooling and Steam Purchased For Consumption' class that belongs to EN3 is consumed by the 'Organization' class which is calculated in the 'Reporting Period' class. Besides, the 'Gross Energy Indirect GHG Emission Scope2' class excludes 'GHG Trade' class. In addition, the 'Chosen Baseline' class is required. Moreover, the classes 'Standard Used', 'Methodology Used', and 'Assumption Used' are expected to calculate and measure emissions. Furthermore, as EN15 the classes 'Source Of Emission Factor Used and Global Warming Potential GWP Rate Or Reference To GWP Source', and 'Chosen Consolidation Approach For Emission' are required (Global Reporting Initiative 2013b, 110-111) as presented in Figure 6.22. The data properties can be found in Table 8.121.

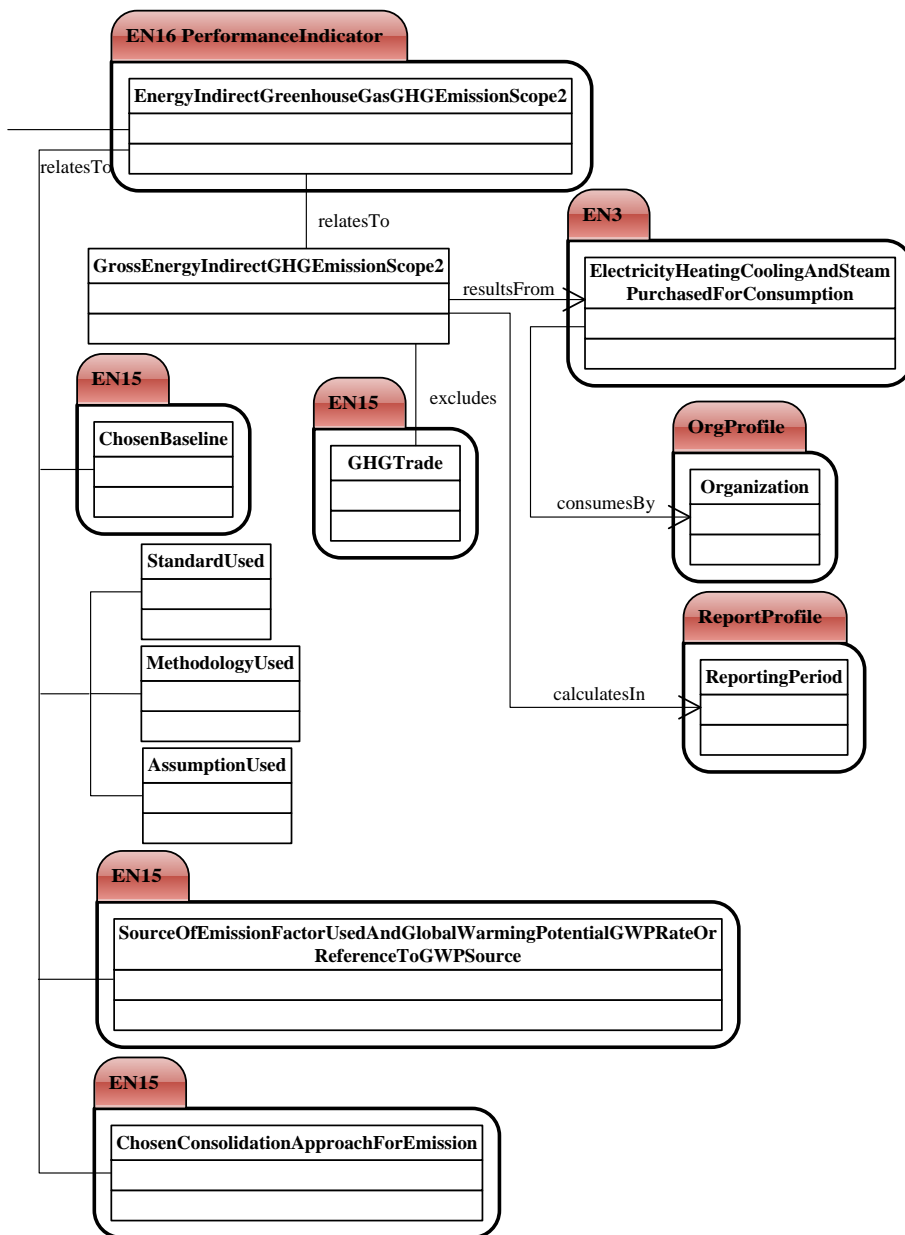


Figure 6.22 Ontology formalization for 'Energy Indirect Greenhouse Gas GHG Emission Scope2 Indicator' class

6.2.5.3. Ontology for 'Other Indirect Greenhouse Gas GHG Emission Scope3 Indicator' class/ EN17

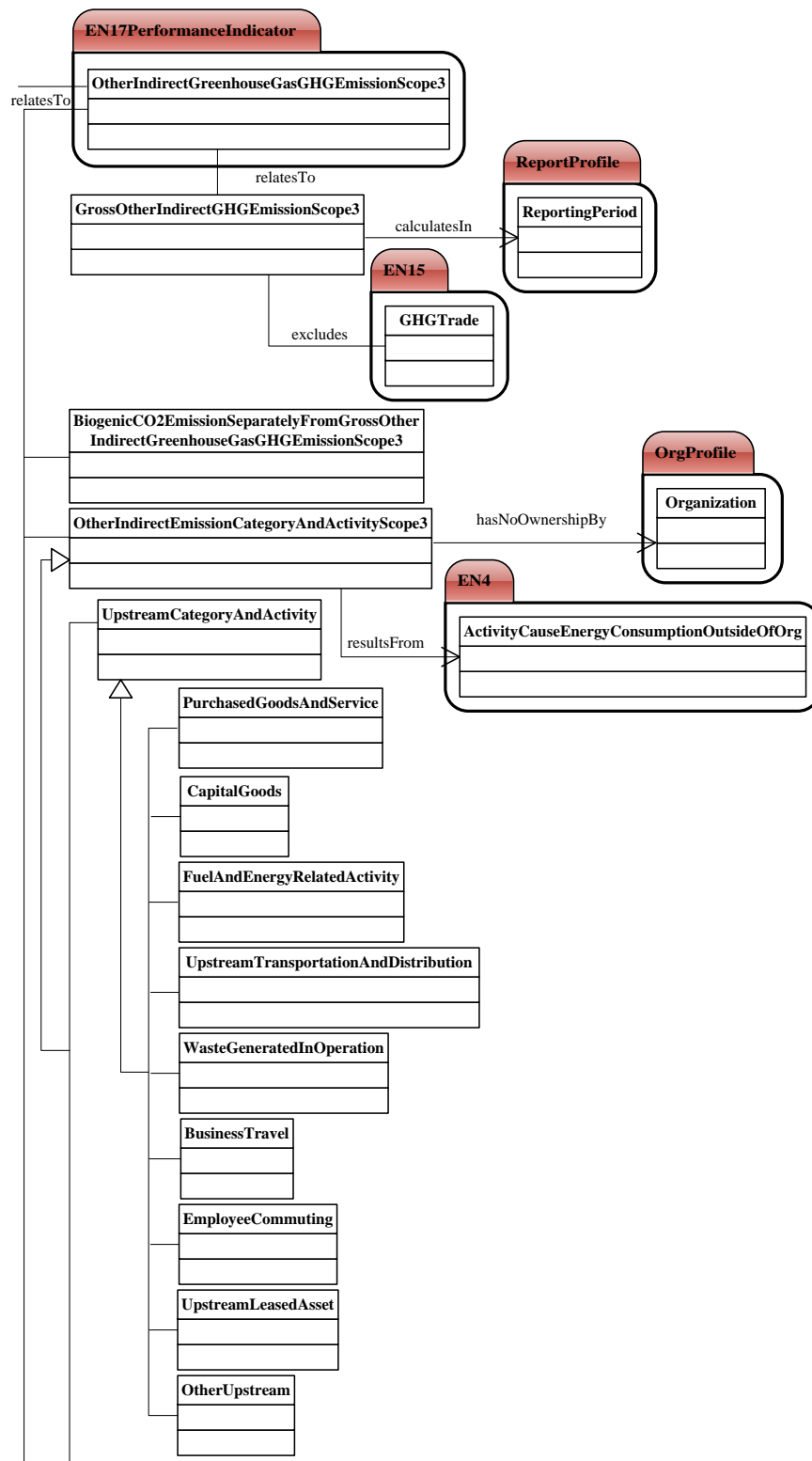
It identifies other greenhouse gas GHG emissions from organization activities from sources not owned by organization. The following classes are related to this indicator class: The 'Gross Other Indirect GHG Emission Scope3' class, 'Biogenic CO₂ Emission Separately From Gross Other Indirect Greenhouse Gas GHG Emission Scope3' class, 'Other Indirect Emission Category and Activity Scope3' class, 'Chosen Baseline' class, 'Standard Used' class, 'Methodology Used' class, 'Assumption Used' class, 'Source Of Emission Factor Used and Global Warming Potential GWP Rate Used Or Reference To GWP Source' class.

The first class 'Gross Other Indirect GHG Emission Scope3' is required in metric tons of CO₂ equivalent which is calculated in the 'Reporting Period' class. The former class excludes the 'GHG Trade' class.

The second class 'Biogenic CO₂ Emission Separately From Gross Other Indirect Greenhouse Gas GHG Emission Scope3' should be reported in metric tons of CO₂ equivalent and separated from the first class.

The third class is 'Other Indirect Emission Category and Activity Scope3' which results from 'Activity Cause Energy Consumption Outside Of Org' is not owned and controlled by the 'Organization' class. The third class is a super-class for the two sub-classes 'Upstream Category and Activity' class and 'Downstream Category and Activity' class. Both sub-classes inherit the datatype property of the super-class amount of indirect emissions caused by organization category and activity. The first sub-class 'Upstream Category and Activity' is a super class for the following sub-classes and they inherit the datatype property of the super-class which is the amount of indirect emissions caused by the organization's upstream category and activity: 'Purchased Goods and Service' class, 'Capital Goods' class, 'Fuel and Energy Related Activity' class, 'Upstream Transportation and Distribution' class, 'Waste Generated In Operation' class, 'Business Travel' class, 'Employee Commuting' class, 'Upstream Leased Asset' class, and 'Other Upstream' class. The second sub-class 'Downstream Category and Activity' class is a super class for the following sub-classes and they inherit the datatype property of the super-class which is the amount of indirect emissions produced by the organization's downstream category and activity: 'Downstream Transportation and Distribution' class, 'Processing Of Sold Product' class, 'Use Of Sold Product' class, 'End Of Life Treatment Of Sold Product' class, 'Downstream Leased Asset' class, 'Franchise' class, 'Investment' class, and 'Other Downstream' class.

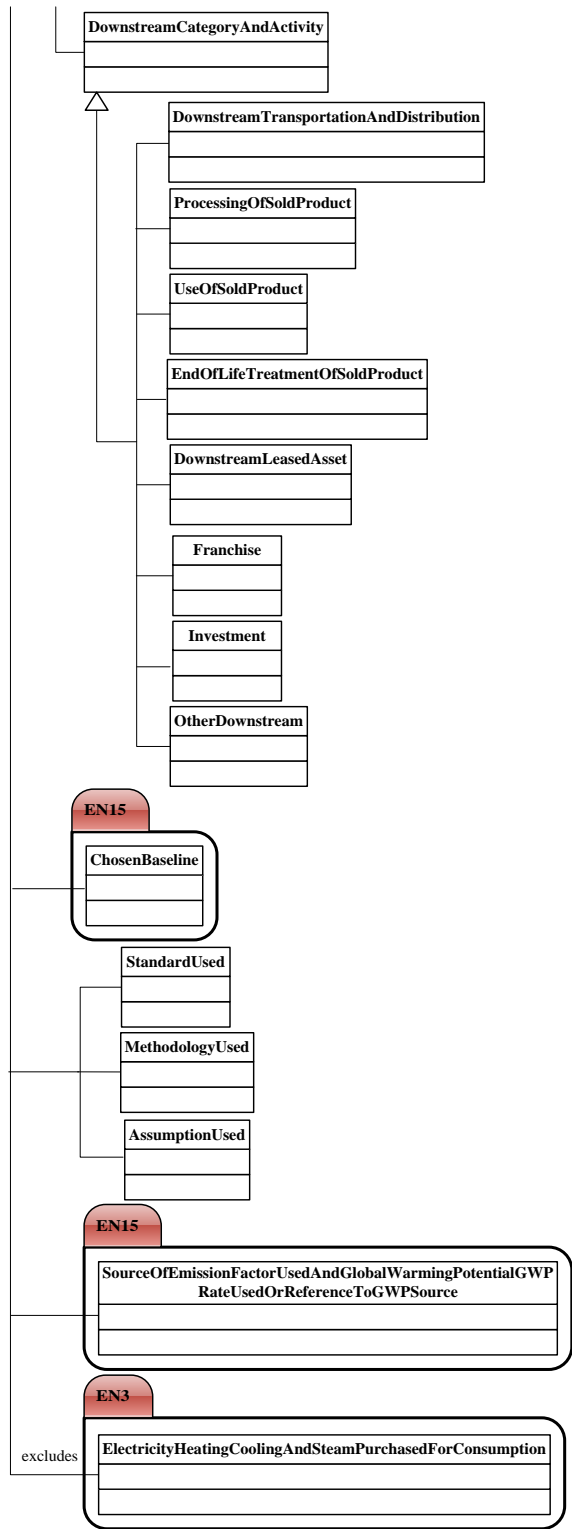
In addition, it is required to report for ‘Chosen Base Year’ class for which emissions data are available. Moreover, ‘Standard Used’ class, ‘Methodology Used’ class, ‘Assumption Used’ class are expected to be reported in order to calculate and measure emissions. Furthermore, like EN 15 and EN16, ‘Source Of Emission Factor Used and Global Warming Potential GWP Rate Used Or Reference To GWP Source’ class are expected to apply emissions factors and GWP rate consistently. Finally, this indicator class excludes ‘Electricity Heating Cooling and Steam Purchased For Consumption’ class listed in EN3 (Global Reporting Initiative 2013b, 112-114). The ontology for this indicator can be seen in Figure 6.23(a) in the upper part and Figure 6.23 (b) in the lower part. The data properties can be found in Table 8.122.



(a) Continued on to next page

Figure 6.23 Ontology formalization for 'Other Indirect Greenhouse Gas GHG Emission Scope3 Indicator' class

Continued from the previous page



(b)

Figure 6.23 (cont) Ontology formalization for 'Other Indirect Greenhouse Gas GHG Emission Scope3 Indicator' class

6.2.5.4. Ontology for ‘Greenhouse Gas GHG Emission Intensity Indicator’ class/ EN18

It refers to GHG emissions intensity ratio. A ‘Greenhouse Gas GHG Emission Intensity Ratio’ class relates to this indicator class. To calculate the intensity ratio of GHG emission, the former class is calculated by dividing a numerator ‘Absolute Greenhouse Gas GHG Emission’ class by a denominator ‘Org Specific Metric For GHG Emission Intensity Ratio’.

The numerator class as a super-class has four sub-classes for each greenhouse gas emission type included in the intensity ratio: direct GHG emissions as explained in EN15 (Scope1), energy indirect GHG emissions as explained in EN16 (Scope2), direct GHG mission (Scope 1) and indirect GHG emission (Scope 2) and other indirect GHG emissions in EN17 (Scope3). It is required that the intensity ratio for Scope1 and Scope 2 be presented as one figure or as a separate figure depending on how the organization is reporting for Scope1 and Scope2; but the intensity ratio for Scope3 should be presented as a separate figure. Therefore, the fourth sub-classes are: ‘Gross Direct GHG Emission Scope1 Intensity Ratio’ class, ‘Gross Energy Indirect GHG Emission Scope2 Intensity Ratio’ class, ‘Gross Direct GHG Emission Scope1 and Gross Energy Indirect GHG Emission Scope2 Intensity Ratio’ class, and ‘Gross Other Indirect GHG Emission Scope3 Intensity Ratio’ class. The fourth sub-classes inherit the datatype property for the super-class which is the intensity ratio of types of GHG emissions. The numerator class ‘Absolute Greenhouse Gas GHG Emission’ includes ‘Gross Direct GHG Emission Scope1’ class or it includes ‘Gross Energy Indirect GHG Emission Scope2’ class, or it combines ‘Gross Direct GHG Emission Scope1 and Gross Energy Indirect GHG Emission Scope2’ class. It depends on whether an organization reports on Scope1 and Scope2 as one figure or separately. For Scope3, it is required to present it separately from Scope1 and Scope2, so the numerator class separates the ‘Gross Other Indirect GHG Emission Scope3’ from Scope1 and Scope2 (Global Reporting Initiative 2013b, 115). The ontology for this indicator is presented in Figure 6.24. The data properties can be found in Table 8.123 to Table 8.124.

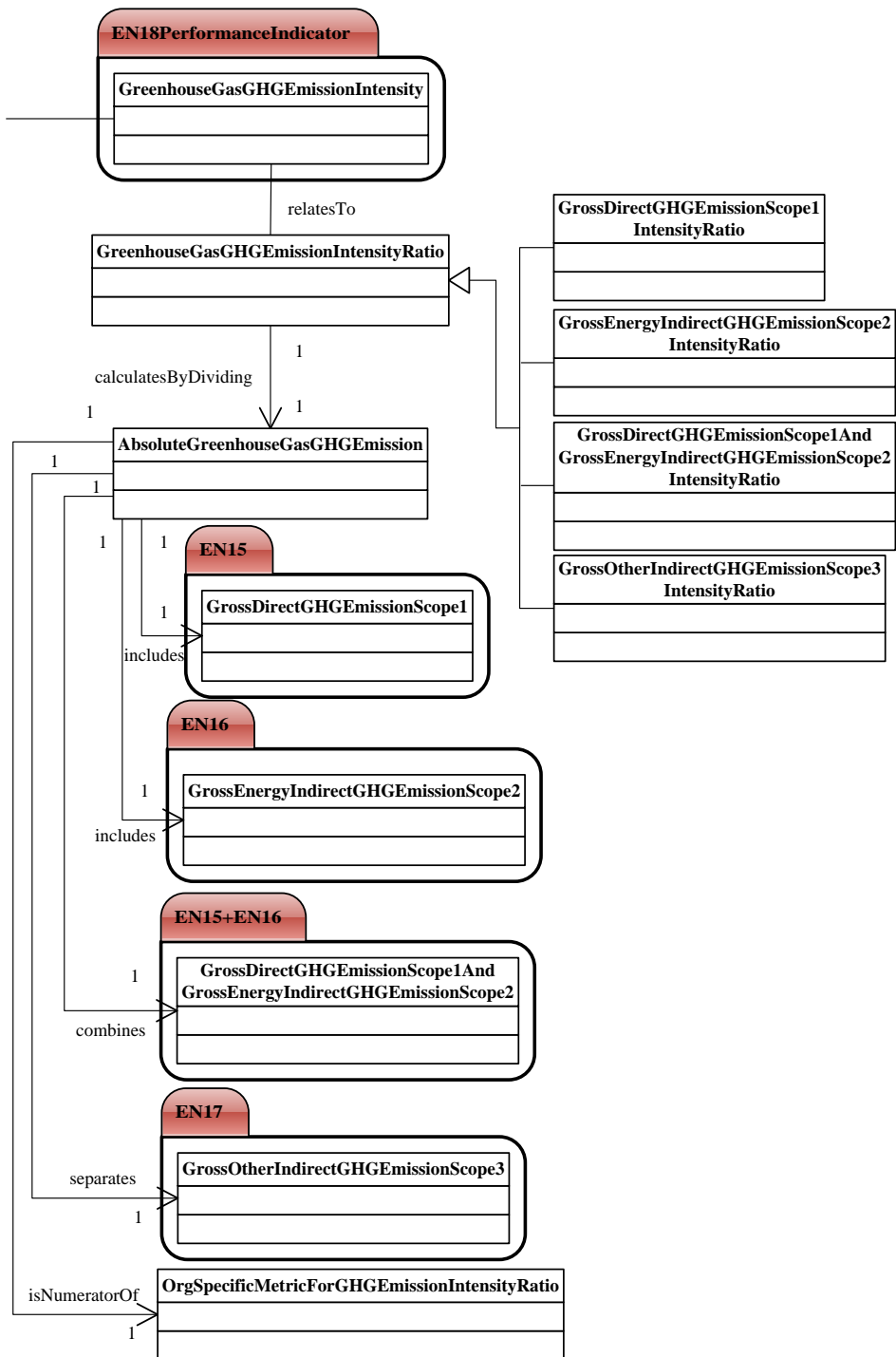


Figure 6.24 Ontology formalization for 'Greenhouse Gas GHG Emission Intensity Indicator' class

6.2.5.5. Ontology for 'Reduction Of Greenhouse Gas GHG Emission' class/ EN19

It identifies initiatives used to reduce the generation of GHG emissions. The classes related to this indicator are: 'Initiative To Reduce Emission' class, 'Chosen Base Year' class, 'Chosen Baseline' class, 'Standard Used' class, 'Methodology Used' , 'Assumption Used' class, and 'Reduction From Offset' . The first related class is used in 'Reporting Period' class. In addition, it is a super-class for the following sub-classes in that they inherit the datatype property amount of GHG achieved in reduction of emissions: 'Process Redesign' class, 'Conversion and Retrofitting Of Equipment' class, 'Fuel Switching' class, 'Change In Employee Behaviour' class, and 'Offset' class. The second class is 'Chosen Base Year' class or 'Chosen Baseline' class. The two methods that account for emissions reductions are the 'Inventory Method' class and 'Project Method' class. 'Inventory Method For Accounting For Emission reduction' class is compared with 'Chosen Base Year' class while 'Project Method For Accounting For Emission reduction' class is compared with 'Chosen Baseline' class. To calculate and measure the reduction of GHG emissions, the 'Standard Used' class, 'Methodology Used' class, and 'Assumption Used' class are required to report. Finally, it is required to report whether the reductions in GHG emissions are separate for direct (Scope 1), energy indirect (Scope 2), other indirect (Scope 3), but excludes the class 'Reduction In Emission From Reduced Production Capacity Or Outsourcing' from this calculations. Simultaneous, the class 'Reduction From Offset' should be reported separately from other reductions (Global Reporting Initiative 2013b, 116-117). The ontology for this indicator class is presented in Figure 6.25. The data properties can be found in Table 8.125 and Table 8.126.

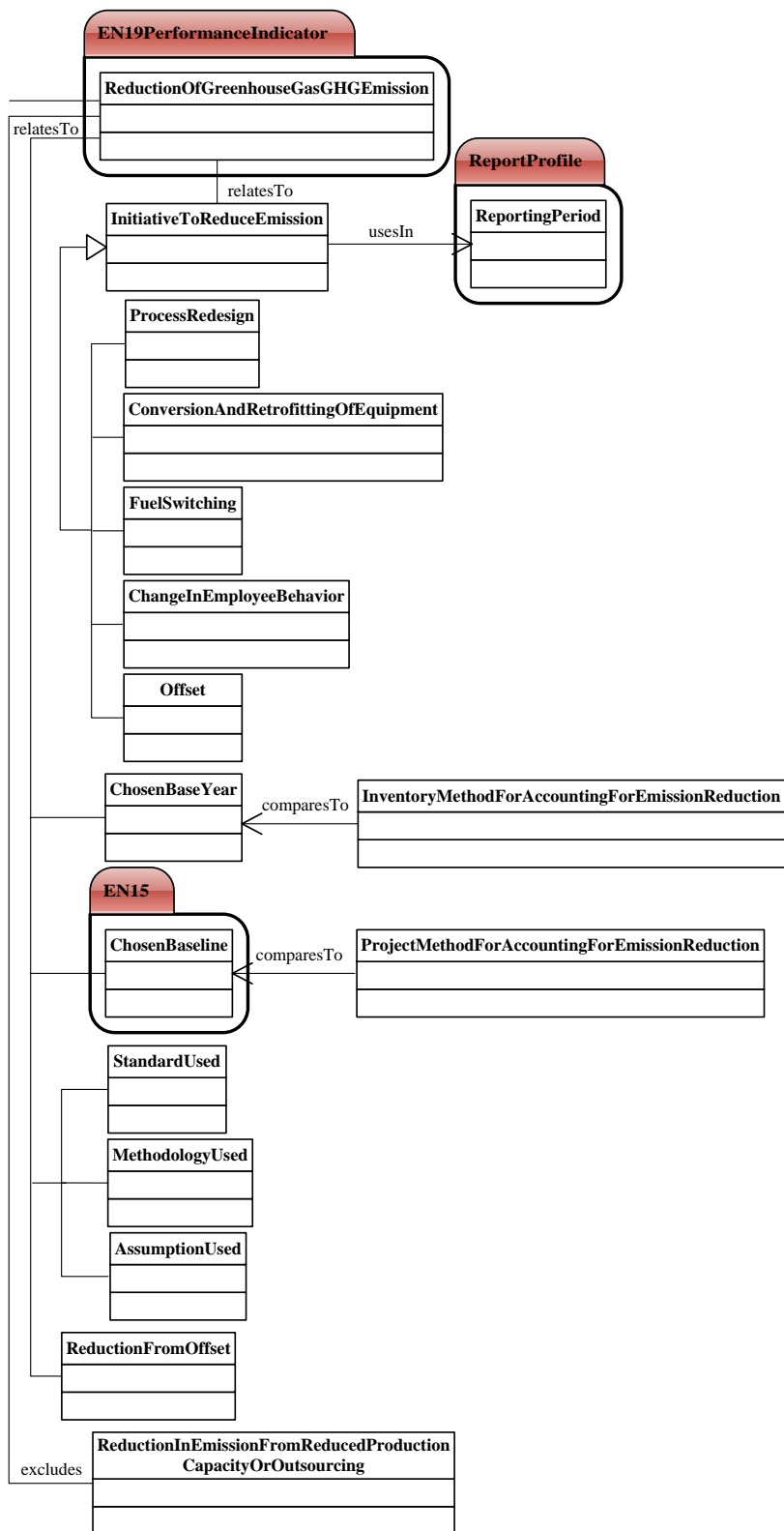


Figure 6.25 Ontology formalization for 'Reduction Of Greenhouse Gas GHG Emission' class

6.2.5.6. Ontology for 'Emission Of Ozone Depleting Substance ODS Indicator' class/ EN20

It identifies ODS produced, imported, or exported by the organization. The classes that relate to this indicator class are: 'Substance' class, 'Standard Used' class, 'Methodology Used' class, 'Assumption Used' class, and 'Source Of Emission Factor Used' class. On the other hand, it excludes the class 'Ozone Depleting Substance ODS Recycled and Reused'. Firstly, the class 'Substance' which is covered in Annexes A, B, C, and E of the United Nations Environment Programme (UNEP) of Ozone-Depleting Substances (ODS) is relevant to the 'Organization' class. In addition, it is the super-class and it has four sub-classes as follows: 'Substance Covered In Annexe A Of UNEP' class, 'Substance Covered In Annexe B Of UNEP' class, 'Substance Covered In Annexe C Of UNEP' class, and 'Substance Covered In Annexe E Of UNEP' class. For every substance covered in Annexe A, B, C, and E of UNEP class as super-class, there are three sub-classes 'Production Of ODS' class, 'Import Of ODS' class, and 'Export Of ODS' class which inherit the datatype property of the super-class: the amount of ODS in metric tons of CFC-11 equivalent. Moreover, the amount of 'Production Of ODS' class is calculated by the amount of 'ODS Produced' class minus the amount of 'ODS Destroyed By Approved Technology' class, and minus the amount of 'ODS Used Entirely' class. Therefore, the three classes stated above in regard to calculating the amount of 'Production Of ODS' are similar for every substance covered in Annexe A, B, C, and E of UNEP. Secondly, to calculate and measure ODS data, there are different 'Standard Used' class, 'Methodology Used' class, and 'Assumption Used' class, and the organization should describe the approach that is chosen. Finally, the organization should report for a class 'Source Of Emission Factor Used' (Global Reporting Initiative 2013b, 118). The ontology for this indicator class is presented in Figure 6.26. The data properties can be found in Table 8.127.

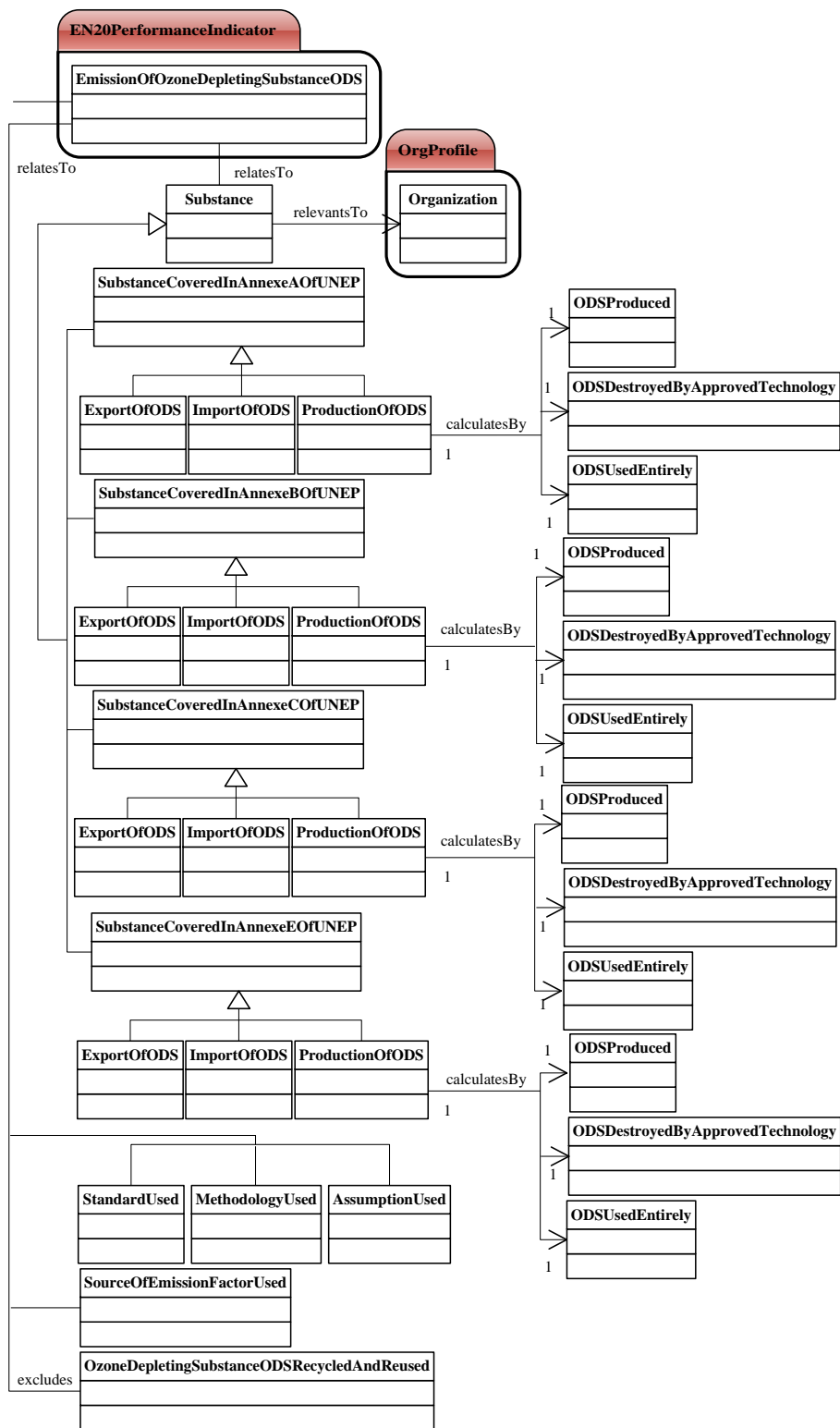


Figure 6.26 Ontology formalization for 'Emission Of Ozone Depleting Substance ODS Indicator' class

6.2.5.7. Ontology for 'NO_x SO_x And Other Significant Air Emission Indicator' class/ EN21

It identifies significant air emissions emitted by the organization and its sources'. The classes that relate to this indicator are: Firstly, 'Significant Air Pollutant and Source Of Significant Air Emission Release To Environment' class which is emitted by the class 'Organization'. Secondly, 'Standard Used' class, 'Methodology Used' class, and 'Assumption Used' class to calculate and measure air emissions should an organization describe the approach to selecting them. Finally, the class 'Source Of Emission Factor Used' is also required. The first related class, as a super-class, has the following sub-classes: 'NO_x Air Emission' class; 'SO_x Air Emission class'; 'Persistent Organic Pollutants (POP)' class; 'Volatile Organic Compounds (VOC)' class; 'Hazardous Air Pollutants (HAP)' class; 'Particulate Matter (PM)' class; and 'Other Standard Category Of Air Emission Identified In Relevant Regulation' class. The preceding sub-classes inherited the datatype property: the amount of significant air emission for the super-class above (Global Reporting Initiative 2013b, 119). The ontology for this indicator class is presented in Figure 6.27. The data properties can be found in Table 8.128.

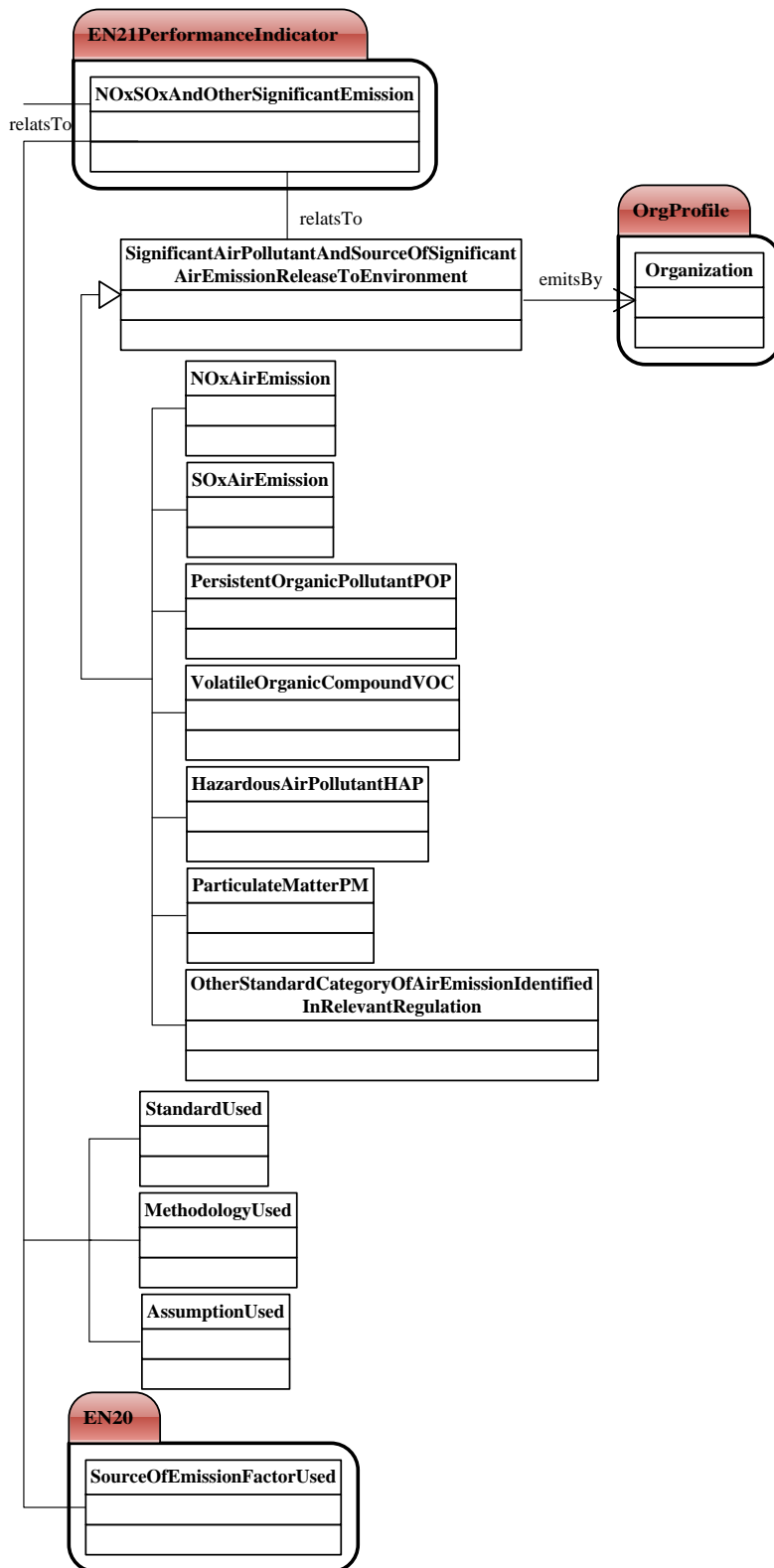


Figure 6.27 Ontology formalization for 'NO_x SO_x And Other Significant Air Emission Indicator' class

6.2.6. Ontology for ‘Effluent and Waste Aspect’ class

This is the sixth Aspect that links to the ‘Environmental Aspect’ class. It focuses on quality and destination of water discharge (English and K.Schooley 2014). There are generic DMAs and five indicators EN22 to EN26. Ontology for ‘Effluent and Waste Aspect’ class is presented in Figure 6.28.

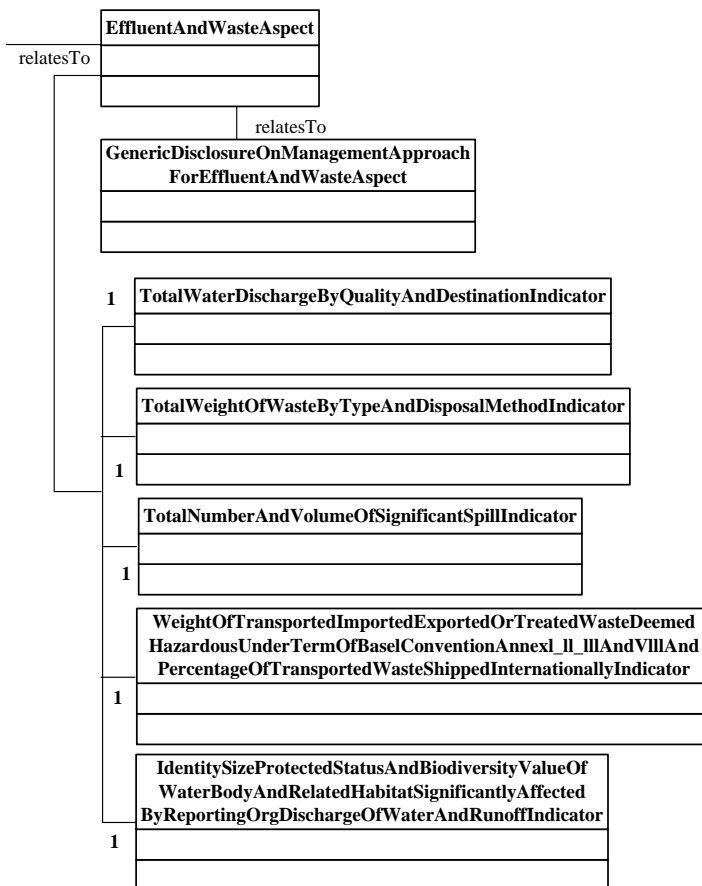


Figure 6.28 Ontology formalization for ‘Effluent And Waste Aspect’ class

In the following subsection, the ontology for the fifth indicators of the class ‘Effluent and Waste Aspect’ is clarified.

6.2.6.1. Ontology for ‘Total Water Discharge By Quality And Destination Indicator’ class/ EN22

It refers to planned and unplanned water discharges by destination and its treatment. The classes that relate to this indicator class are: ‘Water Discharge’, ‘Standard Used’, ‘Methodology Used’ and ‘Assumption Used’. Firstly, it is required to identify ‘Planned Water Discharge’ class and ‘Unplanned Water Discharge’ class. As they are sub-classes, they inherit the datatype property of the super class ‘Water Discharge’. In addition, organizations that discharge ‘Effluent Or Process Water’ class which is kind of the super class ‘Water Discharge’ report water quality using standard effluent parameters to measure it. The estimated process is based on subtracting ‘Water Consumed’ class from ‘Water Withdrawal’ class as reported in G4-EN8. Moreover, the super class excludes the ‘Collected Rainwater and Domestic Sewage’ class. Secondly, the others classes are: ‘Standard Used’, ‘Methodology Used’ and ‘Assumption Used’ to calculate ‘Water Discharge’ by quality and destination (Global Reporting Initiative 2013b, 122). The ontology for this indicator is shown in Figure 6.29. The data properties can be found in Table 8.129.

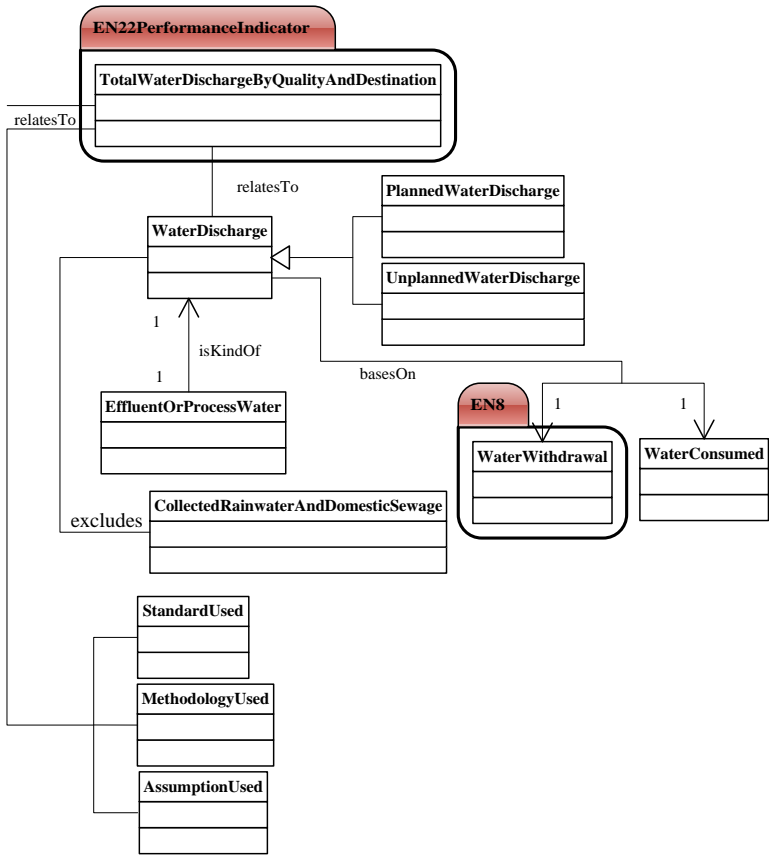


Figure 6.29 Ontology formalization for ‘Total Water Discharge By Quality And Destination Indicator’ class

6.2.6.2. Ontology for 'Total Weight Of Waste By Type And Disposal Method Indicator' class/ EN23

It represents hazardous and non-hazardous waste resulted from organization's operations according to disposal methods. The classes related to this indicator are: 'Waste Type', and 'Waste Disposal Method'. Firstly, it is required to identify the total weight of a super class 'Waste Type' that is categorized into sub-classes: 'Hazardous Waste' and 'Non Hazardous Waste' that inherit the datatype property of super class 'Waste Type'. It should be noted that the second sub-class 'Non Hazardous Waste' excludes 'Waste Water' class. Secondly, the total weight of waste by disposal method is required as 'Waste Disposal Method' class. The latest class as a super class has the following sub-classes divided according to the disposal methods that inherit the datatype property total weight of the super class: 'Waste Disposal Reuse Method', 'Waste Disposal Recycling Method', 'Waste Disposal Composting Method', 'Waste Disposal Recovery Including Energy Recovery Method', 'Waste Disposal Incineration Mass Burn Method', 'Waste Disposal Deep Well Injection Method', 'Waste Disposal Land fill Method', 'Waste Disposal On Site Storage Method', and 'Other Waste Disposal Method' (Global Reporting Initiative 2013b, 123). The ontology for this indicator is shown in Figure 6.30. The data properties can be found in Table 8.130 and Table 8.131.

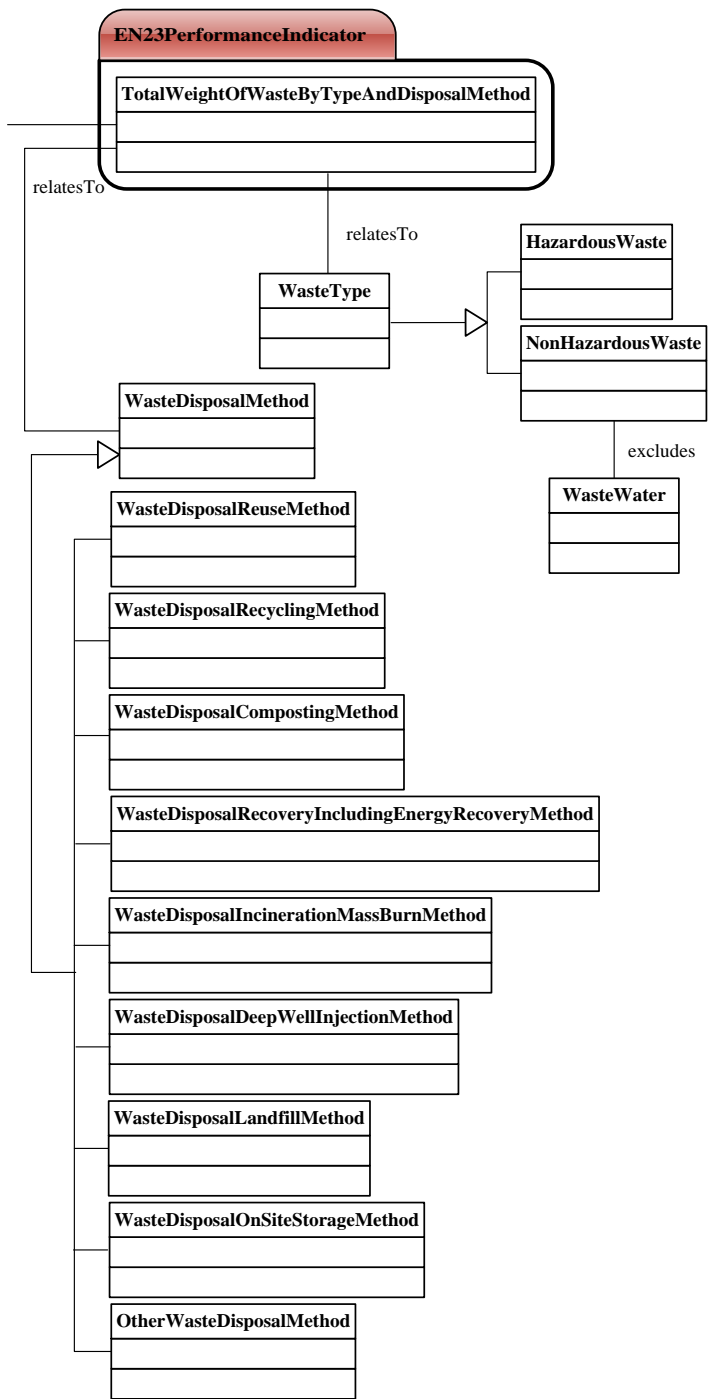


Figure 6.30 Ontology formalization for 'Total Weight Of Waste By Type And Disposal Method Indicator' class

6.2.6.3. Ontology for 'Total Number And Volume Of Significant Spill Indicator' class/ EN24

It relates to significant spill whether it is recorded or reported in organization financial statements. The class that relates to this indicator class is 'Significant Spill'. This class, as a super class, has two sub-classes which are: 'Recorded Significant Spill', and 'Spill Reported In Organization Financial Statement'. The two sub-classes inherit the datatype property for the super class' total number and volume of significant spills. In addition, there are other datatype properties for the second sub-class 'Spill Reported In Organization Financial Statement' location, volume, and material of spill (Global Reporting Initiative 2013b, 124). The ontology for this indicator is presented in Figure 6. 31. The data properties can be found in Table 8.132 and Table 8.133.

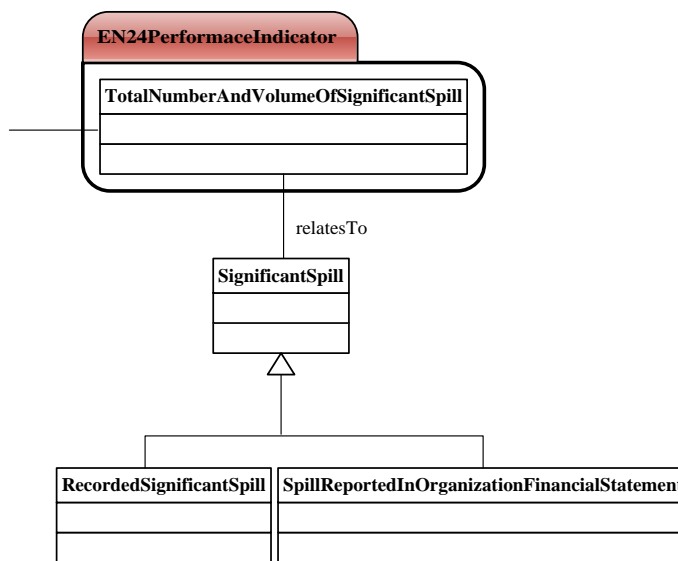


Figure 6.31 Ontology formalization for 'Total Number And Volume Of Significant Spill Indicator' class

6.2.6.4. Ontology for 'Weight Of Transported Imported Exported Or Treated Waste Deemed Hazardous Under Term Of Basel Convention Annex I_ II_ III and VIII And Percentage Of Transported Waste Shipped Internationally Indicator' class/ EN25

It is relevant to hazardous waste transported, imported, exported, and treated shipped internationally by destination in terms of weight and percentage. The classes that relate to this indicator class are: 'Hazardous Waste Transported', 'Hazardous Waste Imported', 'Hazardous Waste Exported', 'Hazardous Waste Treated', 'Percentage Of Hazardous Waste Shipped Internationally' and 'Methodology Used' class. Firstly, it is required to identify the class 'Hazardous Waste Transported' which is transported by or on behalf of 'Organization' class in 'Reporting Period' class by destination. In addition, to calculate the total weight of 'Hazardous Waste Transported', it should report the weight of the following classes: 'Weight Of Hazardous Waste Transported To Org By Destination From External Source Supplier Not Owned By Org', 'Weight Of Hazardous Waste Transported From Org By Destination To External Source Supplier Not Owned By Org', and 'Weight Of Hazardous Waste Transported Nationally and Internationally By Destination Between Location Owned Leased Or Managed By Org'. Secondly, it is required to report the 'Percentage Of Hazardous Waste Shipped Internationally' class. Thirdly, it is required the 'Methodology Used' class to explain how to convert volumes to an estimate of weight (Global Reporting Initiative 2013b, 125). The ontology for this indicator is presented in Figure 6.32.

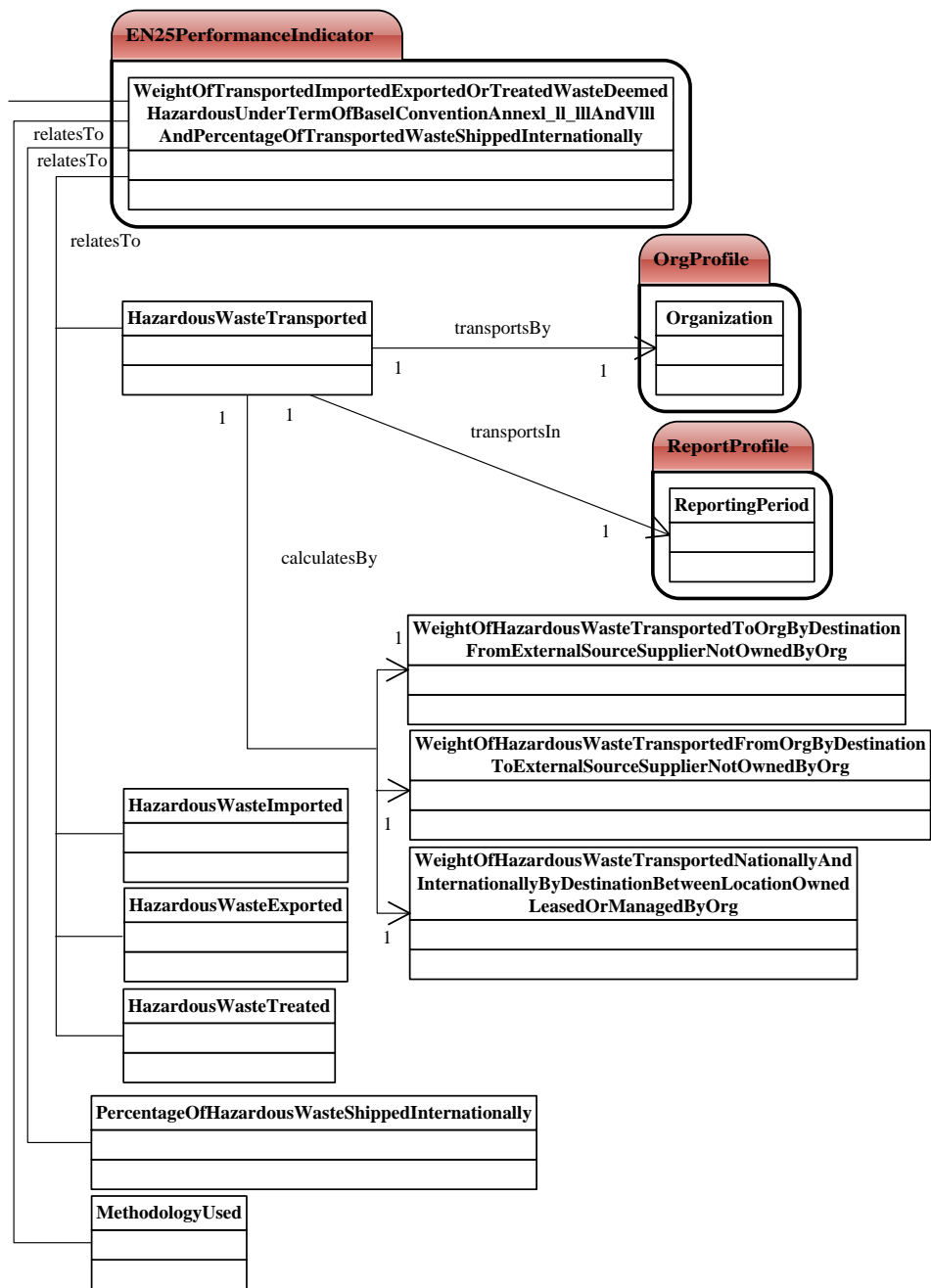


Figure 6.32 Ontology formalization for 'Weight Of Transported Imported Exported Or Treated Waste Deemed Hazardous Under Term Of Basel Convention Annex I, II, III And VIII And Percentage Of Transported Waste Shipped Internationally Indicator' class

6.2.6.5. Ontology for ‘Identity Size Protected Status and Biodiversity Value Of Water Body and Related Habitat Significantly Affected By Org Discharge Of Water And Run Off Indicator’ class/ EN26

It signifies water body that significantly affects by water discharge. The classes that relate to this indicator are: ‘Water Body’ which is discharged by ‘Organization’ class. It is required to identify the class ‘Water Body’ that is affected by ‘Water Discharge’ class (Global Reporting Initiative 2013b, 126). The ontology for this indicator is presented in Figure 6.33.

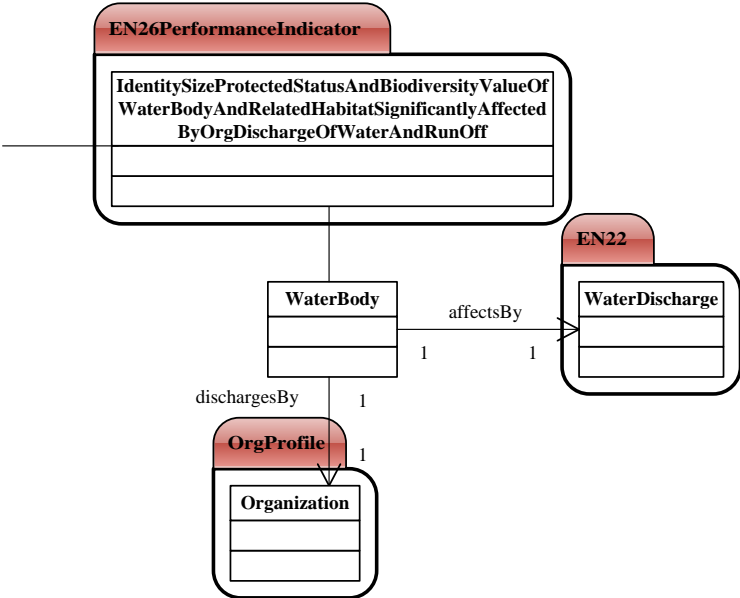


Figure 6.33 Ontology formalization for ‘Identity Size Protected Status And Biodiversity Value Of Water Body And Related Habitat Significantly Affected By Org Discharge Of Water And Run Off Indicator’ class

6.2.7. Ontology for ‘Product and Service Aspect’ class

This is the seventh Aspect that links to ‘Environmental Aspect’ class. It focuses on “mitigation of environmental impacts of products and services” (English and K.Schooley 2014). There are generic DMA For Product and Service Aspect and two indicators EN27 and EN28. Ontology for ‘Product and Service Aspect’ class is shown in Figure 6.34.

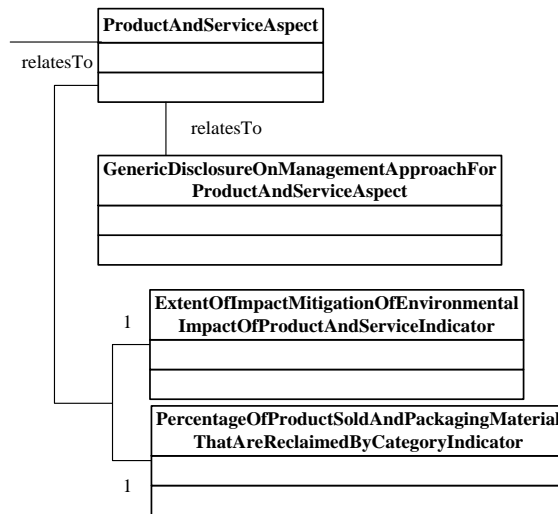


Figure 6.34 Ontology formalization for ‘Product And Service Aspect’ class

In the following subsection, the ontology for the two indicators of the class ‘Product and Service Aspect’ is explained.

6.2.7.1. Ontology for ‘Extent Of Impact Mitigation Of Environmental Impact Of Product and Service Indicator’ class/ EN27

It describes initiatives undertaken to mitigate significant environmental impacts of products and services. The classes that relate to this indicator class are: ‘Specific Initiative Undertaken To Mitigate Most Significant Environmental Impact Of Product and Service Group class which is undertaken in ‘Reporting Period’ class; and ‘Extent To Which Environmental Impact Of Product and Service Mitigated’ class which has mitigated in ‘Reporting Period’ class; but, the following classes are excluded from this indicator class which are: ‘Reclaiming Of Product and Product Packaging’ class under G4-EN 28 and ‘Impact On Biodiversity’ class under G4-EN 12 in ‘Reporting Period’ class (Global Reporting Initiative 2013b, 128). The ontology for this indicator is presented in Figure 6.35. The data properties can be found in Table 8.134.

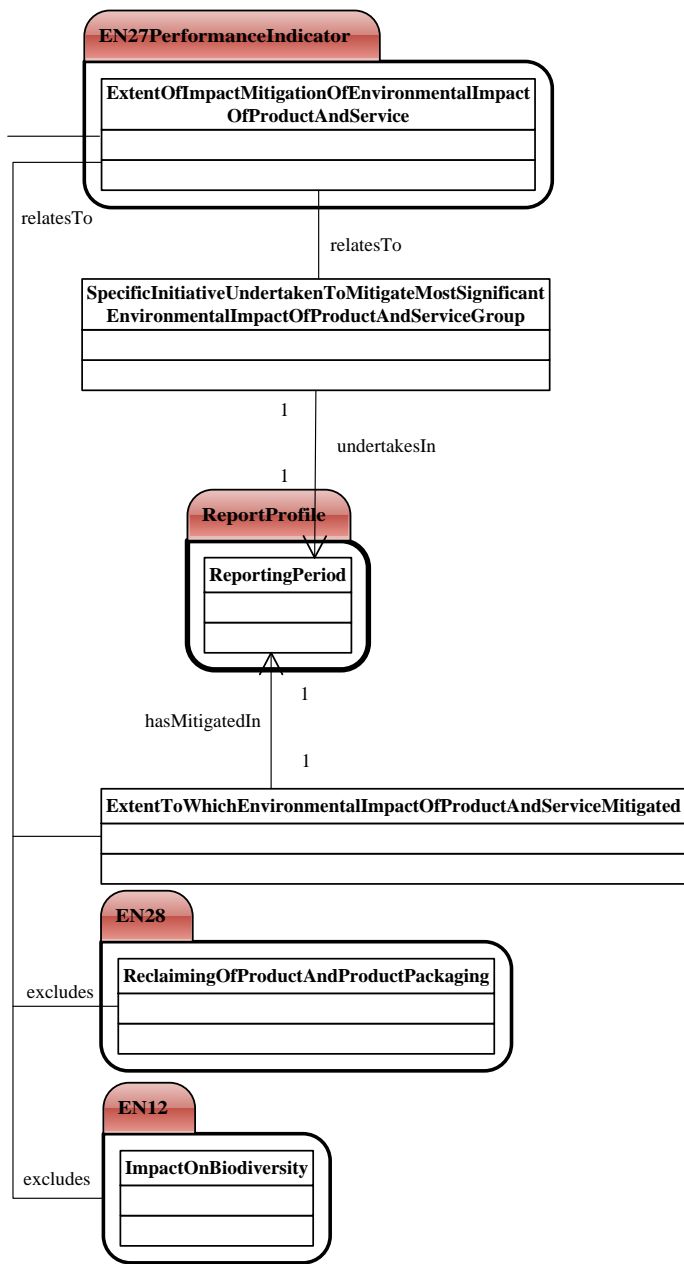


Figure 6.35 Ontology formalization for 'Extent Of Impact Mitigation Of Environmental Impact Of Product And Service Indicator' class

6.2.7.2. Ontology for ‘Percentage Of Product Sold And Packaging Material That Is Reclaimed By Category Indicator’ class/ EN28

It refers to percentage of reclaimed products and their packaging materials. Firstly, this indicator class is calculated for each ‘Product Category’ class. The indicator class is calculated by dividing the class ‘Product Sold and Packaging Material Reclaimed’ which is reclaimed in ‘Reporting Period’. The ‘Product Sold and Packaging Material Reclaimed’ class is numerator of the ‘Product Sold’ class which is sold in ‘Reporting Period’. Secondly, the ‘Recycling Or Reuse Of Packaging’ class is required to be reported (Global Reporting Initiative 2013b, 129). The ontology for this indicator is presented in Figure 6.36.

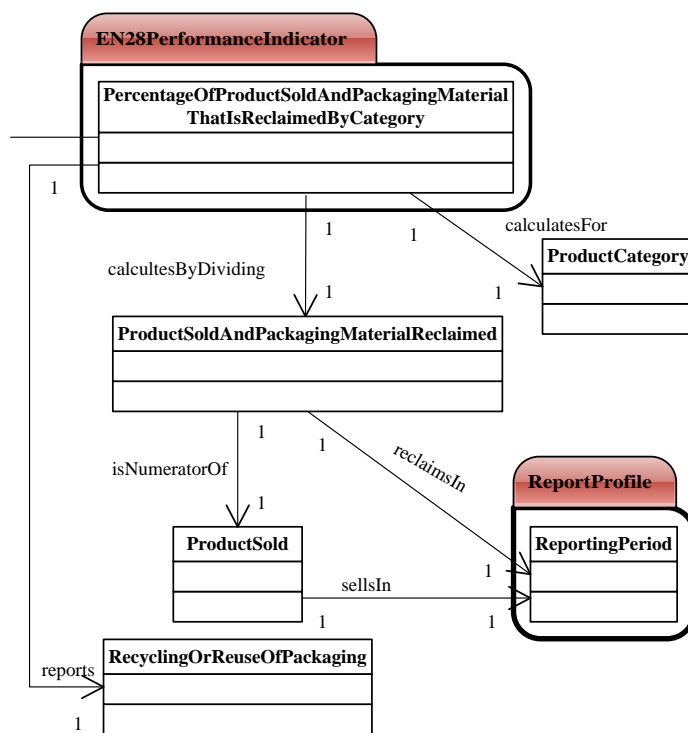


Figure 6.36 Ontology formalization for ‘Percentage Of Product Sold And Packaging Material Indicator’ class

6.2.8. Ontology for ‘Compliance Aspect’ class

This is the eighth Aspect that belongs to ‘Environmental Aspect’ class. It emphasizes “fines and nonmonetary sanctions for noncompliance” (English and K.Schooley 2014). There is a generic DMA For Compliance Aspect and only one indicator, EN29. Ontology for the ‘Compliance Aspect’ class is shown in Figure 6.37.

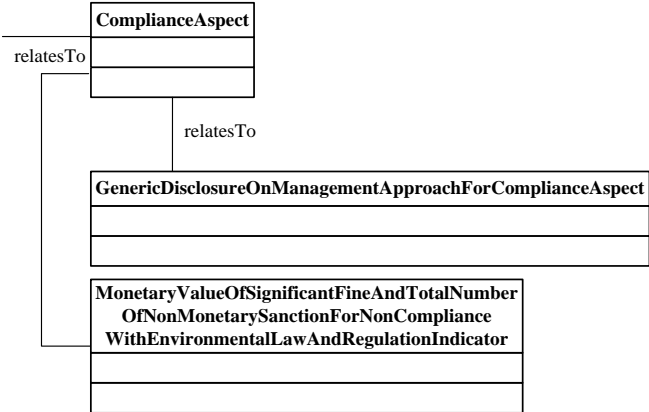


Figure 6.37 Ontology formalization for ‘Compliance Aspect’ class

In the following subsection, the ontology for the only indicator of the class ‘Compliance Aspect’ is explained.

6.2.8.1. Ontology for ‘Monetary Value Of Significant Fine And Total Number Of Non-Monetary Sanction For Non Compliance With Environmental Law And Regulation Indicator’ class/ EN29

It identifies administrative or judicial sanctions for breakingdown environmental laws and regulations. The class that relates to this indicator class is ‘Administrative Or Judicial Sanction For Failure To Comply With Environmental Law and Regulation’ class which is related to the ‘Organization’ class. The first class related to this indicator includes the following classes: ‘International Declaration Convention Treaty and National Sub National Regional and Local Regulation’ which includes ‘Significant Spill’ class under EN24; ‘Voluntary Environmental Agreement With Regulating Authority’; and ‘International and National Dispute Mechanism’ class (Global Reporting Initiative 2013b, 131). The ontology for this indicator is presented in Figure 6.38. The data properties can be found in Table 8.135

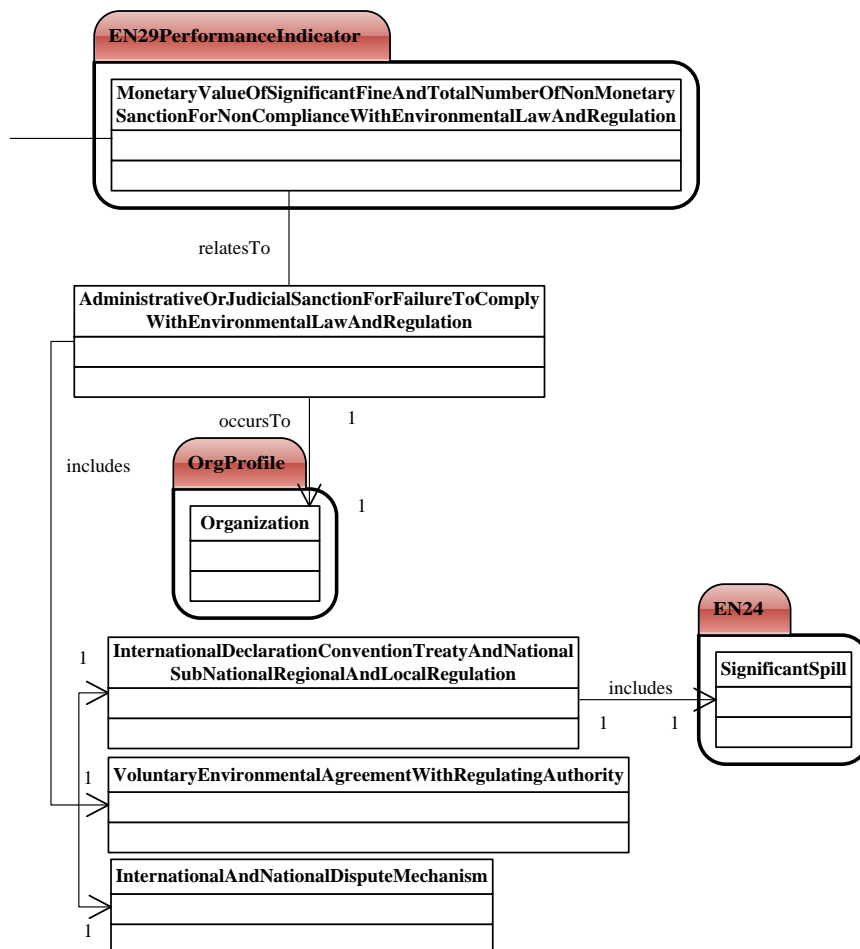


Figure 6.38 Ontology formalization for ‘Monetary Value Of Significant Fine And Total Number Of Non-Monetary Sanction For Non Compliance With Environmental Law And Regulation Indicator’ class

6.2.9. Ontology for ‘Transport Aspect’ class

This is the ninth Aspect that belongs to the ‘Environmental Aspect’ class. It emphasizes the “environmental impacts of transporting products and workforce” (English and K.Schooley 2014). There is a generic DMA and one indicator EN30. Ontology for the ‘Transport Aspect’ class is shown in Figure 6.39.

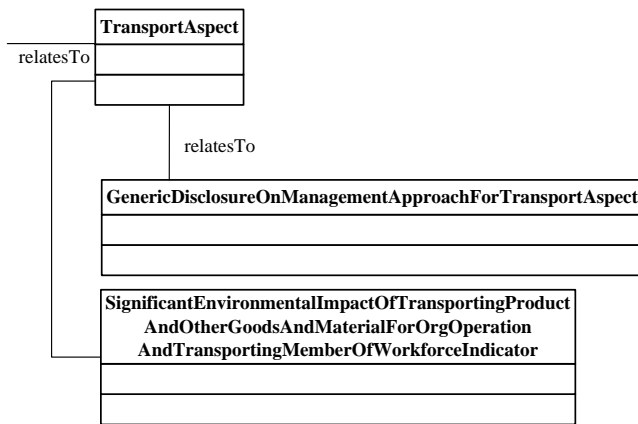


Figure 6.39 Ontology formalization for ‘Transport Aspect’ class

In the following subsection, the ontology for the one sole indicator of the class ‘Transport Aspect’ is explained.

6.2.9.1. Ontology for ‘Significant Environmental Impact Of Transporting Product and Other Goods And Material For Org Operation And Transporting Member Of Workforce Indicator’ class/ EN30

It relates to significant environmental impacts of the modes of transportation used by organization and how to mitigate them. This indicator class is a super-class for the sub-classes that inherit the three data properties. The sub-classes for this indicator class are: ‘Impact Of Mode Of Transportation On Energy Use’; ‘Impact Of Mode Of Transportation On Emission’; ‘Impact Of Mode Of Transportation On Effluent’; ‘Impact Of Mode Of Transportation On Waste’; ‘Impact Of Mode Of Transportation On Noise’; and ‘Impact Of Mode Of Transportation On Spill’ (Global Reporting Initiative 2013b, 133). The ontology for this indicator is presented in Figure 6.40.

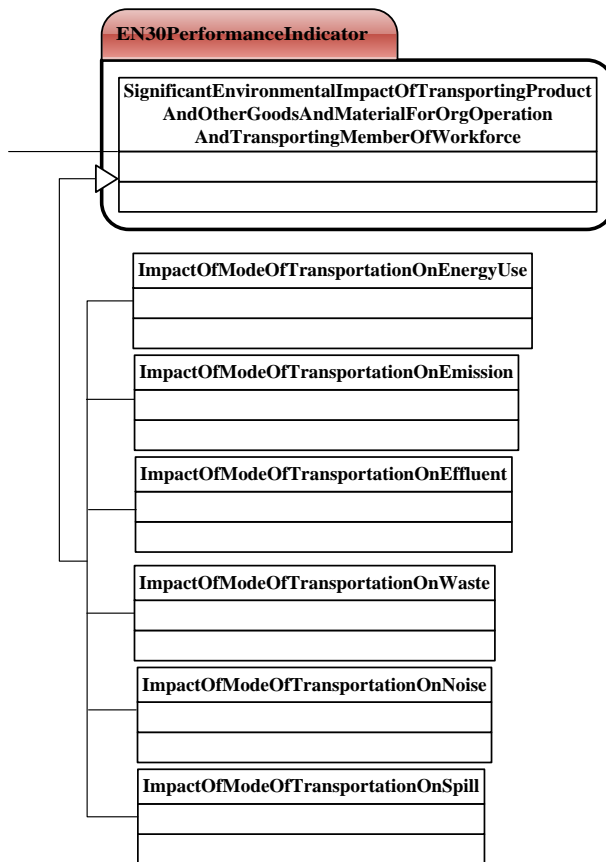


Figure 6.40 Ontology formalization for ‘Significant Environmental Impact Of Transporting Product And Other Goods And Material For Org Operation And Transporting Member Of Workforce Indicator’ class

6.2.10. Ontology for ‘Overall Aspect’ class

This is the tenth Aspect that belongs to the ‘Environmental Aspect’ class. It concentrates on “environmental protection expenditures and investments” (English and K.Schooley 2014). The classes that relate to this Aspect are: generic DMA and only one indicator EN31 class. Ontology for the ‘Overall Aspect’ class is shown in Figure 6.41.

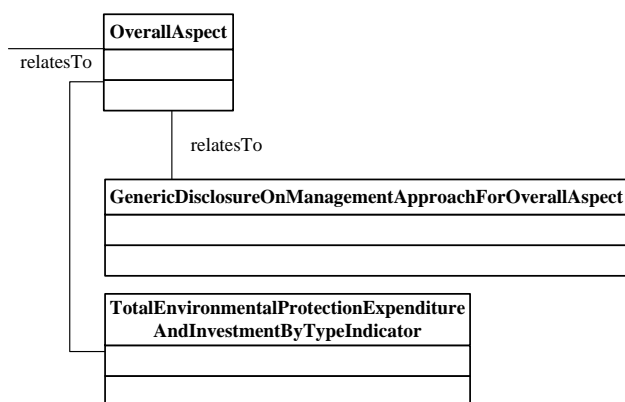


Figure 6.41 Ontology formalization for ‘Overall Aspect’ class

In the following subsection, the ontology for the one and only indicator of the class ‘Overall Aspect’ is explained.

6.2.10.1. Ontology for ‘Total Environmental Protection Expenditure And Investment By Type Indicator’ class/ EN31

It refers to waste disposal, emissions treatment, and remediation costs and prevention and environmental management costs based on type of expenditures. The classes that relate to this indicator class are: ‘Waste Disposal Emission Treatment and Remediation Cost’ which includes ‘Significant Spill’ class under EN24, and ‘Prevention and Environmental Management Cost’. Note that the class ‘Fine For Non Compliance With Environmental Regulation’ under EN29 is excluded from this indicator class as long as it is required the total cost of environmental protection expenditures (Global Reporting Initiative 2013b, 135). The ontology for this indicator is presented in Figure 6.42.

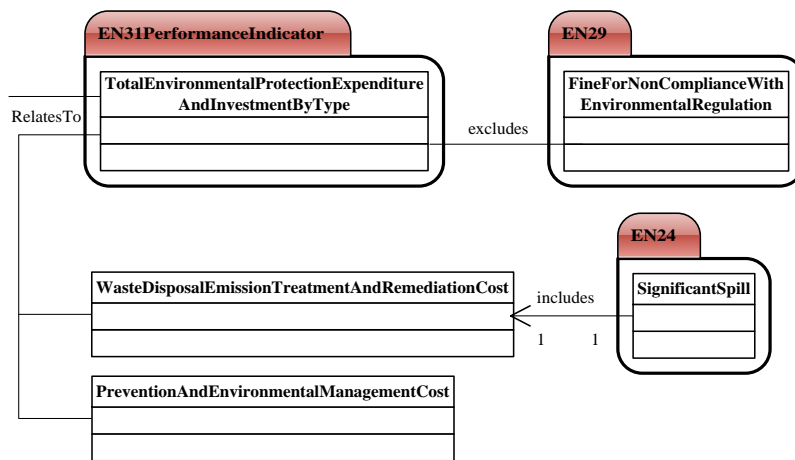


Figure 6.42 Ontology formalization for ‘Total Environmental Protection Expenditure And Investment By Type Indicator’ class

6.2.11. Ontology for ‘Supplier Environmental Assessment Aspect’ class

This is the eleventh Aspect that links to the ‘Environment Aspect’ class. It concerns suppliers screened using environmental criteria (English and K.Schooley 2014). There are generic and specific DMAs and two indicators classes EN32 to EN33 as shown in Figure 6.43.

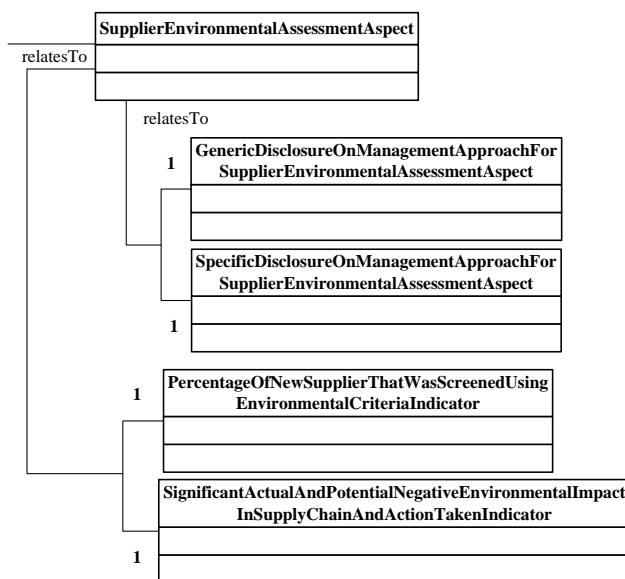


Figure 6.43 Ontology formalization for ‘Supplier Environmental Assessment Aspect’ class

The following subsection specifically defines ontology for the ‘Supplier Environmental Assessment Aspect’ class.

6.2.11.1. Ontology for ‘Percentage Of New Supplier That Was Screened Using Environmental Criteria Indicator’ class/ EN32

It refers to new suppliers that contract with the organization and use environmental criteria. To calculate this percentage as indicator class, this is done by dividing the class ‘Total Number Of New Supplier Using Environmental Criteria’ out of the class ‘Total Number Of New Supplier Contracting With Org’ as a numerator class (Global Reporting Initiative 2013b, 138). The ontology for this indicator is given in Figure 6.44. The data properties appear in Table 8.136.

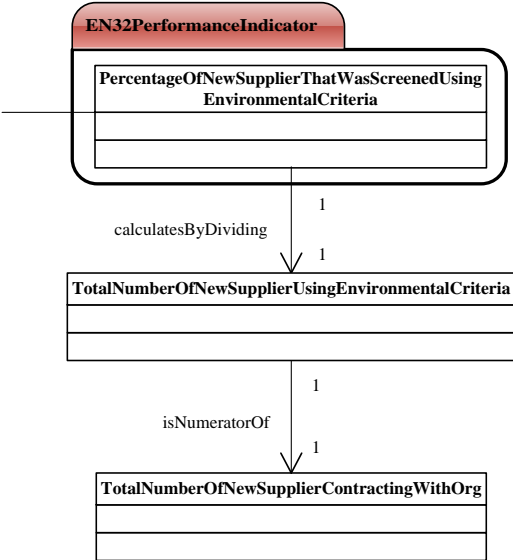


Figure 6.44 Ontology formalization for ‘Percentage Of New Supplier That Was Screened Using Environmental Criteria Indicator’ class

6.2.11.2. Ontology for ‘Significant Actual And Potential Negative Environmental Impact In Supply Chain And Action Taken Indicator’ class/EN33

It concerns environmental impacts in the supply chain and actions taken. It is required to identify and assess significant actual and potential negative environmental impacts in the supply chain and actions taken toward them. The classes related to this indicator class are: Firstly, ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Environmental Impact As Result Of Assessment’, and Secondly, ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Environmental Impact As Result Of Assessment and Action Taken’.

To calculate the first related percentage class, this is done by dividing the class ‘Supplier Subject To Environmental Impact Assessment’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Environmental Impact’. To calculate the second related percentage class, this is done by dividing the class ‘Action Taken Toward Supplier Identified Having Significant Actual and Potential Negative Environmental Impact’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Environmental Impact’ (Global Reporting Initiative 2013b, 139). The ontology for this indicator is shown in Figure 6.45.

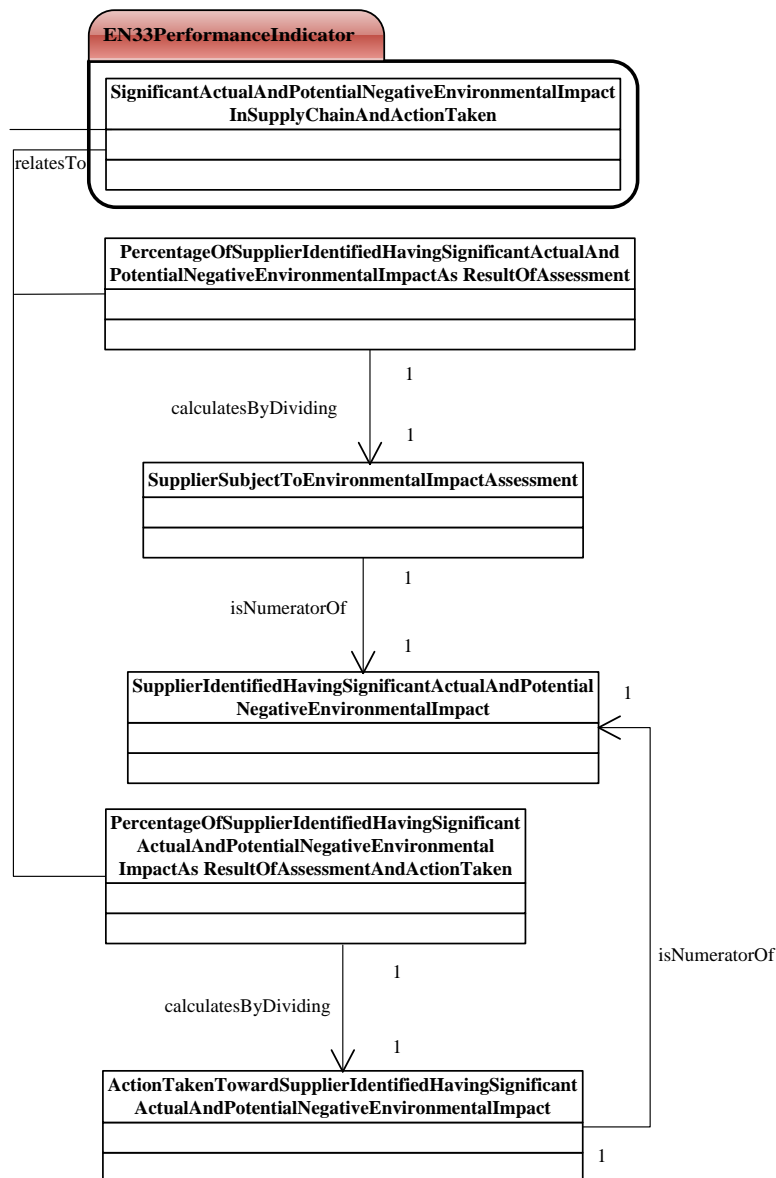


Figure 6.45 Ontology formalization for ‘Significant Actual And Potential Negative Environmental Impact In Supply Chain And Action Taken Indicator’ class

6.2.12. Ontology for ‘Environmental Grievance Mechanism Aspect’ class

This is the twelfth Aspect that links to the ‘Environmental Aspect’ class. It concentrates on “environmental impacts grievances” (English and K.Schooley 2014). There are generic and specific DMAs and only one indicator class EN34 as shown in Figure 6.46.

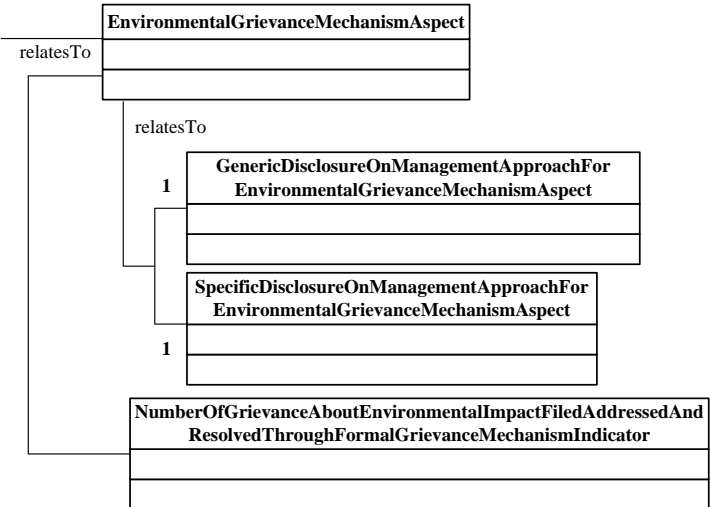


Figure 6.46 Ontology formalization for ‘Environmental Grievance Mechanism Aspect’ class

6.2.12.1. Ontology for ‘Number Of Grievance About Environmental Impact Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class/ EN34

It concerns existing formal grievance mechanisms about environmental impacts managed by organization or by an external party. The identified grievances must be reported for the following classes: ‘Grievances About Environmental Impact Filed’; ‘Grievances About Environmental Impact Addressed’, and ‘Grievances Environmental Impact Resolved’ which is occurred in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 141). The ontology for this indicator is shown in Figure 6.47. The data properties can be found in Table 8.137 to Table 8.139.

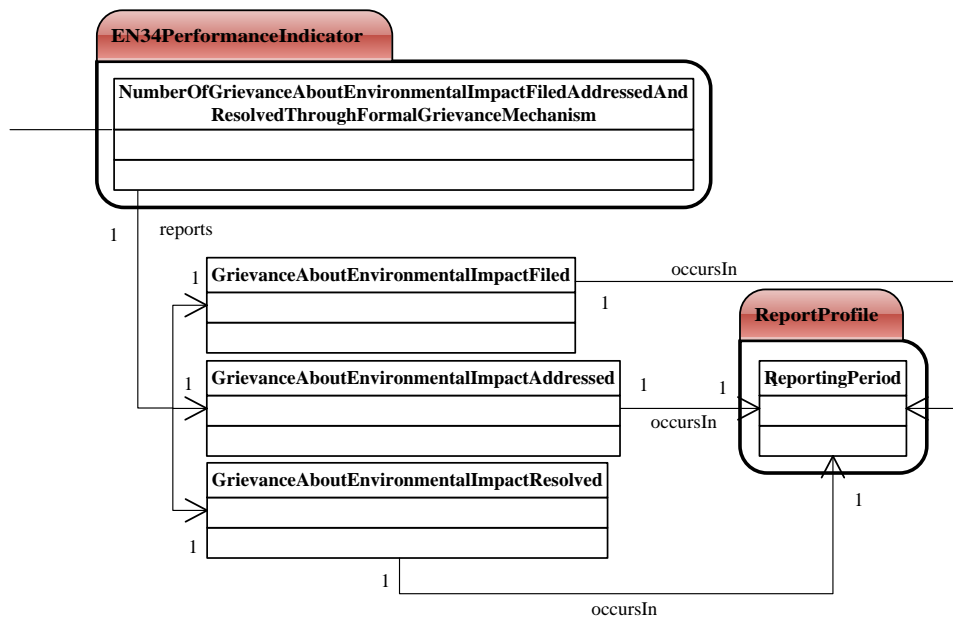


Figure 6.47 Ontology formalization for ‘Number Of Grievance About Environmental Impact Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class

6.3. Summary

This chapter explains the ontology for the ‘Environmental Aspect’ class, concentrating on thirty-four environmental performance indicators as classes according to GRI G4. So, the ontology for each one is clarified. The next chapter illustrates the ontology for ‘Social Category’ class.

Chapter 7. Ontology for social category class

7.1. Introduction

This chapter concentrates on the impacts of an organization’s activities on social systems within which it operates (Global Reporting Initiative 2013b, 142). GRI G4 classified this category according to four classes of Aspects: ‘Labor Practice and Decent Work’, ‘Human Rights’, ‘Society’, and ‘Product Responsibility’. In this chapter, the ontologies for these four Aspects classes are explained, concentrating on indicators for each Aspect. The summary is provided in section 7.3.

7.2. Ontology for ‘Social Aspect’ class

According to GRI G4, this category class is classified according to four classes of Aspects: ‘Labor Practice and Decent Work’, ‘Human Rights’, ‘Society’, and ‘Product Responsibility’. Figure 7.1 shows the ontology formalization for the ‘Social Aspect’ class.

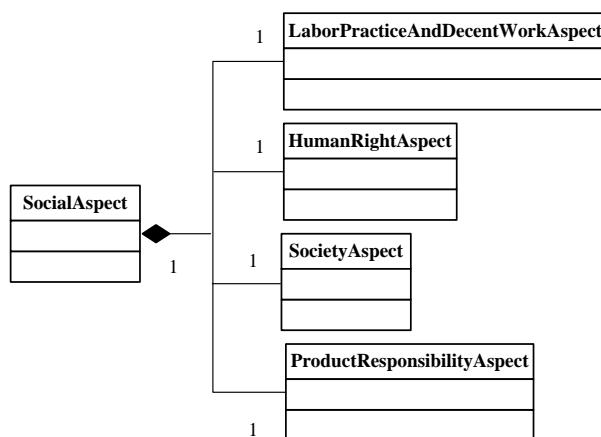


Figure 7.1 Ontology formalization for ‘Social Aspect’ class

7.2.1. Ontology for ‘Labor Practice and Decent Work Aspect’ class

There are eight classes of Aspects in the ‘Labor Practice and Decent Work Aspect’ class as indicated in Figure 7.2. They are: ‘Employment Aspect’, ‘Labor Management Relation Aspect’, ‘Occupational Health and Safety Aspect’, ‘Training and Education Aspect’, ‘Diversity and Equal Opportunity Aspect’, ‘Equal Remuneration For Women and Men Aspect’, ‘Supplier Assessment For Labor Practice Aspect’, ‘Labor Practice Grievance Mechanism Aspect’.

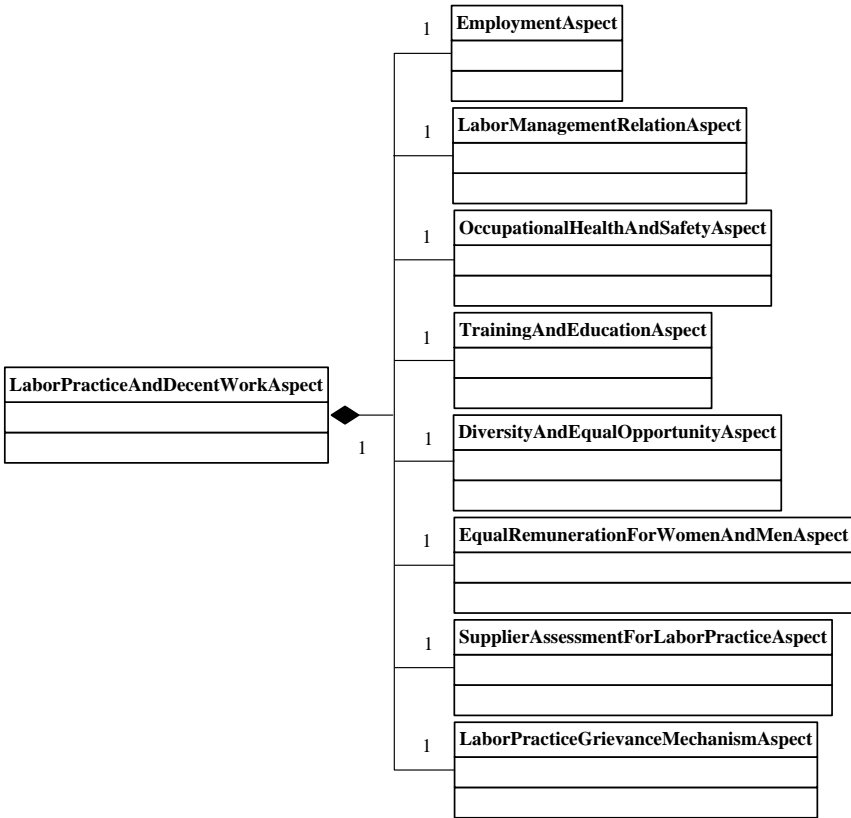


Figure 7.2 Ontology formalization for ‘Labor Practice And Decent Work Sub Aspect’ class

7.2.1.1. Ontology for ‘Employment Aspect’ class

This is the first Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class. The essence of this Aspect is “hires and turnover by age” (English and K.Schooley 2014). There are generic and specific DMAs and three indicators that relate to this Aspect LA1 to LA3 as shown in Figure 7.3.

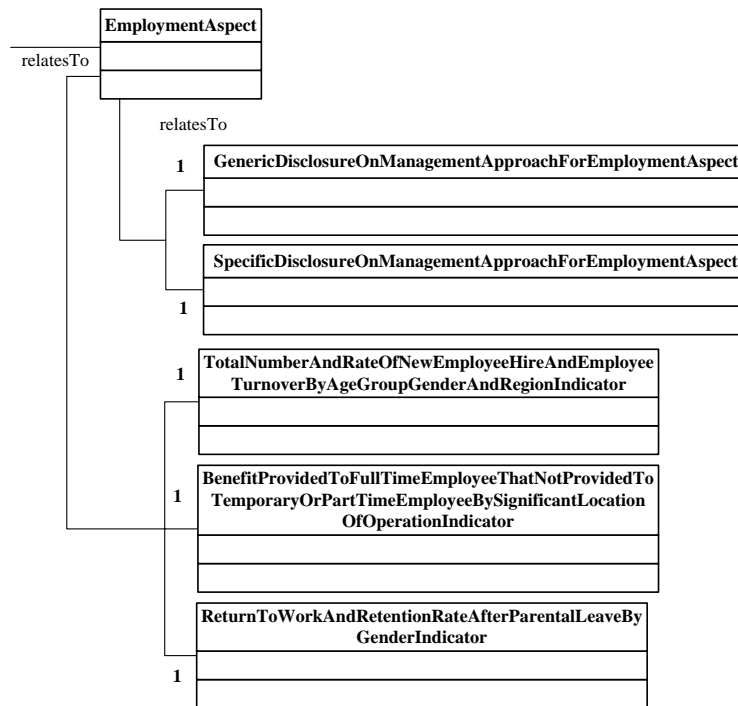


Figure 7.3 Ontology formalization for ‘Employment Aspect’ class

7.2.1.1.1. Ontology for ‘Total Number and Rate Of New Employee Hire And Employee Turnover By Age Group Gender And Region Indicator’ class/ LA1

It identifies new employee hire and the employee turnover by age group, gender and region. The classes that related to this indicator are: Firstly, ‘New Employee Hire’ class which is divided into three classes ‘New Employee Hire By Age Group’, ‘New Employee Hire By Gender’, and ‘New Employee Hire By Region’. The first related class hires in the ‘Reporting Period’ class. Secondly, ‘Employee Turnover’ class is divided into three classes ‘Employee Turnover By Age Group’, ‘Employee Turnover By Gender’, and ‘Employee Turnover By Region’. The second related class reports in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 146). The ontology formalization for this indicator is presented in Figure 7.4. The data properties for this indicator can be found in Tables 8.140 to 8.145.

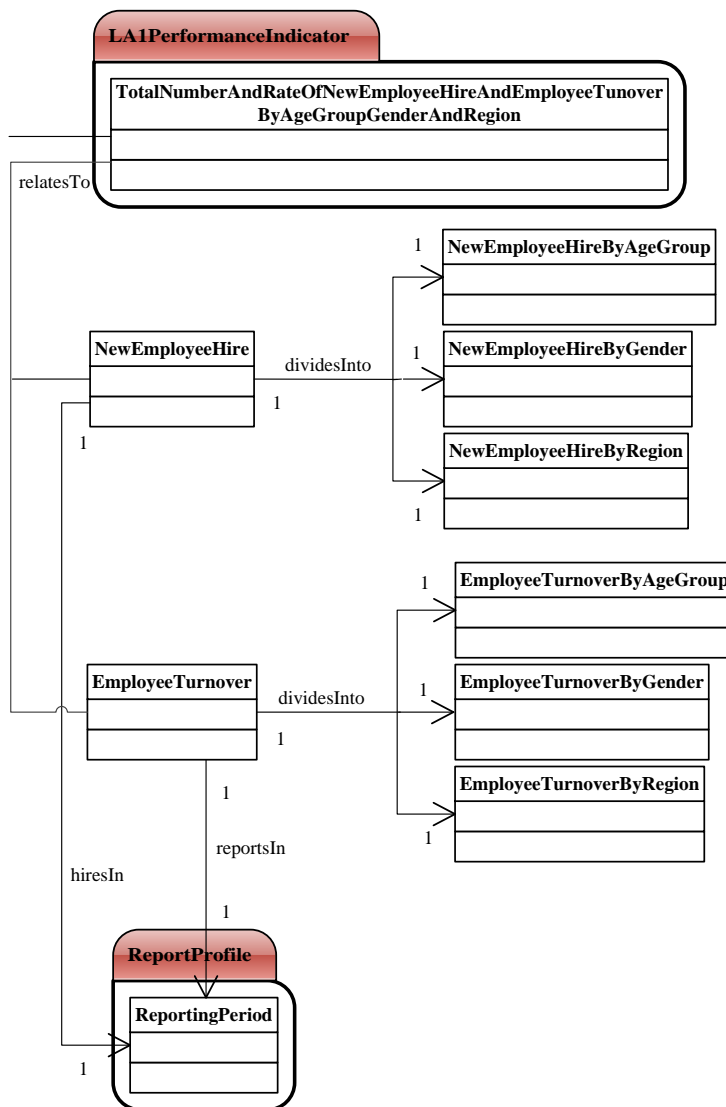


Figure 7.4 Ontology formalization for ‘Total Number And Rate Of New Employee Hire And Employee Turnover By Age Group Gender And Region Indicator’ class

7.2.1.1.2. Ontology for ‘Benefit Provided To Full Time Employee That Is Not Provided To Temporary Or Part Time Employee By Significant Location Of Operation/ LA2

It refers to standard benefits provided for full-time and not for part-time employees of the organization. The class that relates to this indicator is ‘Standard Benefit To Full Time Employee’ which is provided by the ‘Organization’ class. In addition, it should be broken down according to ‘Location Of Operation’ class (Global Reporting Initiative 2013b, 147). The ontology formalization for this indicator is shown in Figure 7.5. The data properties can be found in Table 8.146.

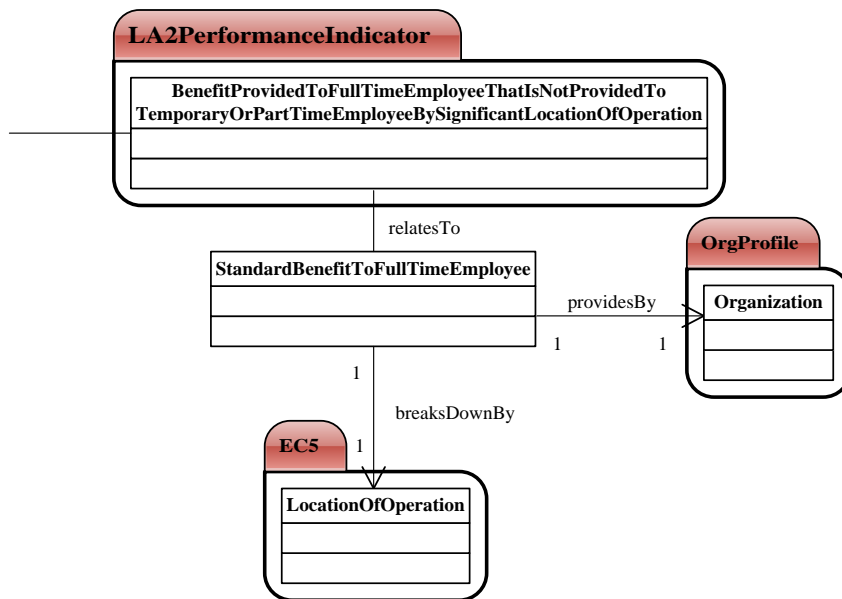


Figure 7.5 Ontology for ‘Benefit Provided To Full Time Employee That Is Not Provided To Temporary Or Part Time Employee By Significant Location Of Operation Indicator’ class

7.2.1.1.3. Ontology for ‘Return To Work And Retention Rate After Parental Leave By Gender Indicator’ class/ LA3

It indicates return to work rate and retention rate by gender after parental leave. For this indicator class, it is required to report for the following classes: firstly, ‘Employee Entitled To Parental Leave’; secondly, ‘Employee Taken Parental Leave’ class; thirdly, ‘Employee Returned To Work After Parental Leave Ended’ class; fourthly, ‘Employee Returned To Work After Parental Leave Ended Who Still Employed Twelve Month After Return To Work’ class; fifthly ‘Return To Work Rate Of Employee Who Took Parental Leave’ class; and finally, ‘Retention Rate Of Employee Who Took Parental Leave’ class (Global Reporting Initiative 2013b, 148). The ontology formalization for this indicator is shown in Figure 7.6. The data properties can be found in Tables 8.147 to 8.152.

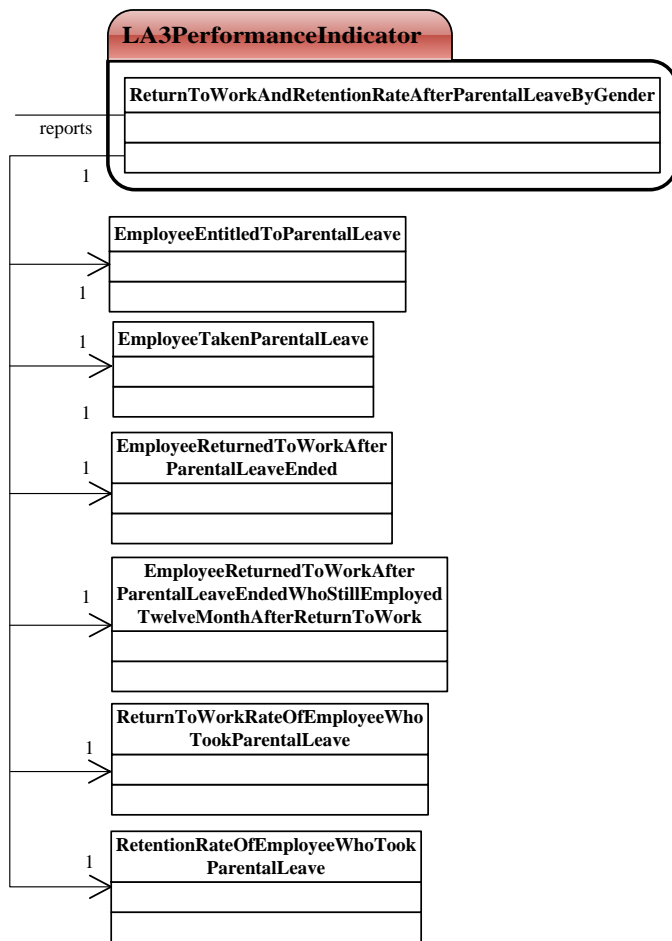


Figure 7.6 Ontology formalization for ‘Return To Work And Retention Rate After Parental Leave By Gender Indicator’ class

7.2.1.2. Ontology for ‘Labor Management Relation Aspect’ class

This is the second Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class. This Aspect concentrates on “operational change notices” (English and K.Schooley 2014). There is generic DMA and LA4 indicator that included this Aspect as presents in Figure 7.7.

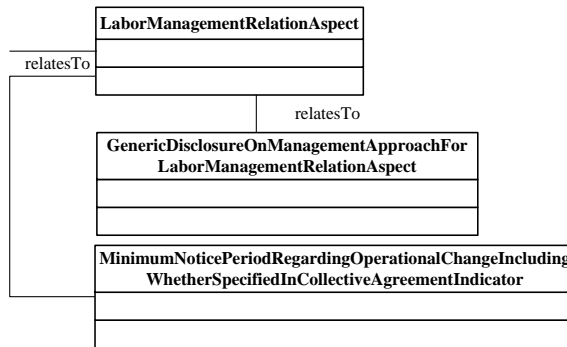


Figure 7.7 Ontology formalization for ‘Labor Management Relation Aspect’ class

7.2.1.2.1. Ontology for ‘Minimum Notice Period Regarding Operational Change Including Whether Notice Period Specified In Collective Agreement Indicator’ class/ LA4

It signifies minimum notice periods existing in corporate policies and stanard employment contracts. The class ‘Significant Operation Change’ relates to this indicator class which is covered by ‘Employee Covered By Collective Bargaining Agreement’ class (Global Reporting Initiative 2013b, 150). The ontology formalization for this indicator is shown in Figure 7.8. The data properties can be found in Table 8.154.

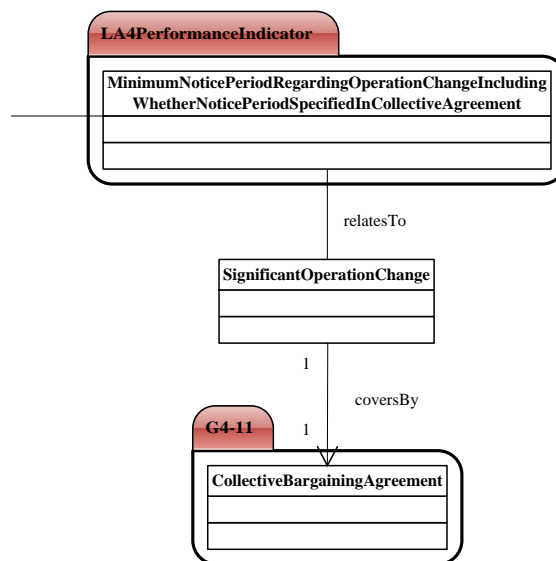


Figure 7.8 Ontology formalization for ‘Minimum Notice Period Regarding Operational Change Including Whether Notice Period Specified In Collective Agreement Indicator’ class

7.2.1.3. Ontology for ‘Occupational Health and Safety Aspect’ class

This is the third Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class within ‘Social Category’ class. This indicator emphasizes “workforce participation on health and safety committees” (English and K.Schooley 2014). There are generic and specific DMAs and four indicators relate to this Aspect LA5 to LA8 as shown in Figure 7.9.

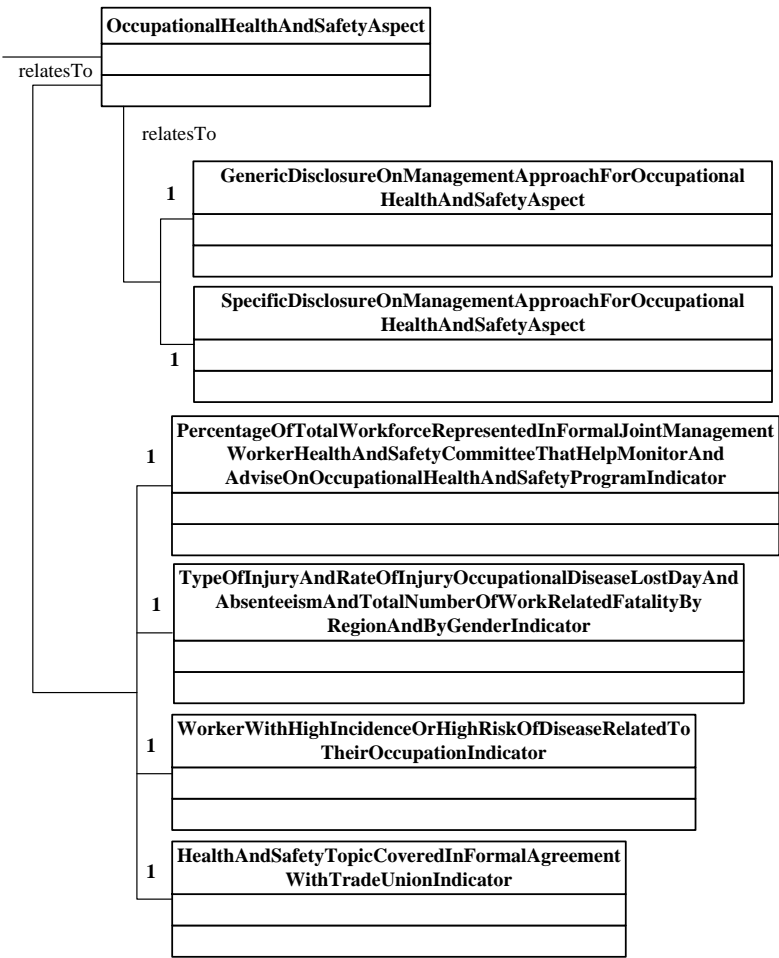


Figure 7.9 Ontology formalization for ‘Occupational Health And Safety Aspect’ class

7.2.1.3.1. Ontology for ‘Percentage Of Total Workforce Represented In Formal Joint Management Worker Health And Safety Committee That Help Monitor And Advise On Occupational Health And Safety Program Indicator’ class/ LA5

It relates to formal health and safety committees that help on occupational safety programs. The class that relates to this indicator class is ‘Workforce Represented In Formal Joint Management Worker Health and Safety Committee’ which operates at ‘Organization’ class (Global Reporting Initiative 2013b, 152). The ontology formalization for this indicator is shown in Figure 7.10. The data properties can be found in Table 8.155.

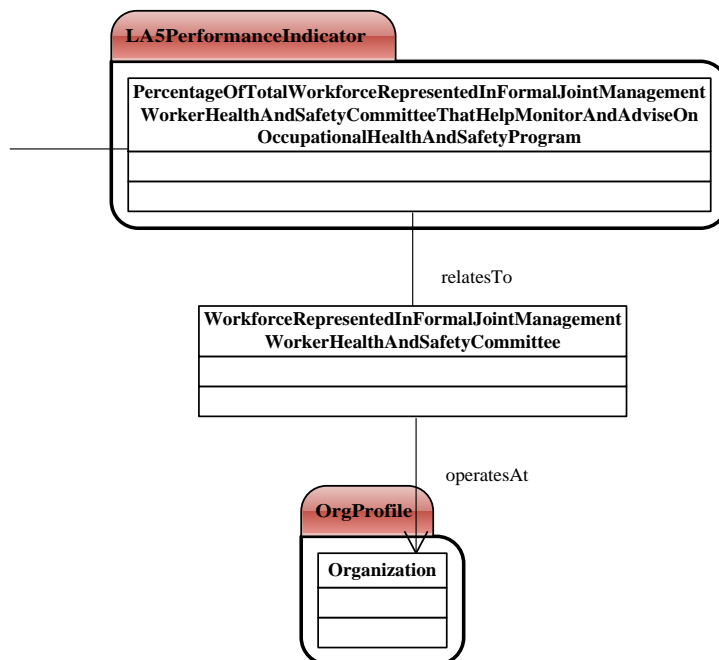


Figure 7.10 Ontology formalization for ‘Percentage Of Total Workforce Represented In Formal Joint Management Worker Health And Safety Committee That Help Monitor And Advise On Occupational Health And Safety Program Indicator’ class

7.2.1.3.2. Ontology for 'Type Of Injury And Rate Of Injury Occupational Disease Lost Day And Absenteeism And Total Number Of Work Related Fatality By Region And By Gender Indicator' class/ LA6

It relates to the system of rules applied in recording and reporting accident statistics and the system used to track and report on health and safety incidents and performance . It is required to report for the following classes: Firstly, in regard to the total workforce: 'Type Of Injury For Total Workforce', 'Injury Rate For Total Workforce', 'Occupational Disease Rate For Total Workforce', 'Lost Day Rate For Total Workforce', 'Absentee Rate For Total Workforce', and 'Work Related Fatality For Total Workforce' which occurs in the 'Reporting Period' class. Secondly, in regard to Independent Contractor: 'Type Of Injury For Independent Contractor', 'Injury Rate For Independent Contractor', 'Occupational Disease Rate For Independent Contractor', 'Absentee Rate For Independent Contractor', and 'Work Related Fatality For Independent Contractor' occurs in the 'Reporting Period' class. Thirdly, there is the 'System Of Rule Applied In Recording and Reporting Accident Statistic' class (Global Reporting Initiative 2013b, 153). The ontology formalization for this indicator is shown in Figure 7.11. The data property can be found in Tables 8.156 to 8.162.

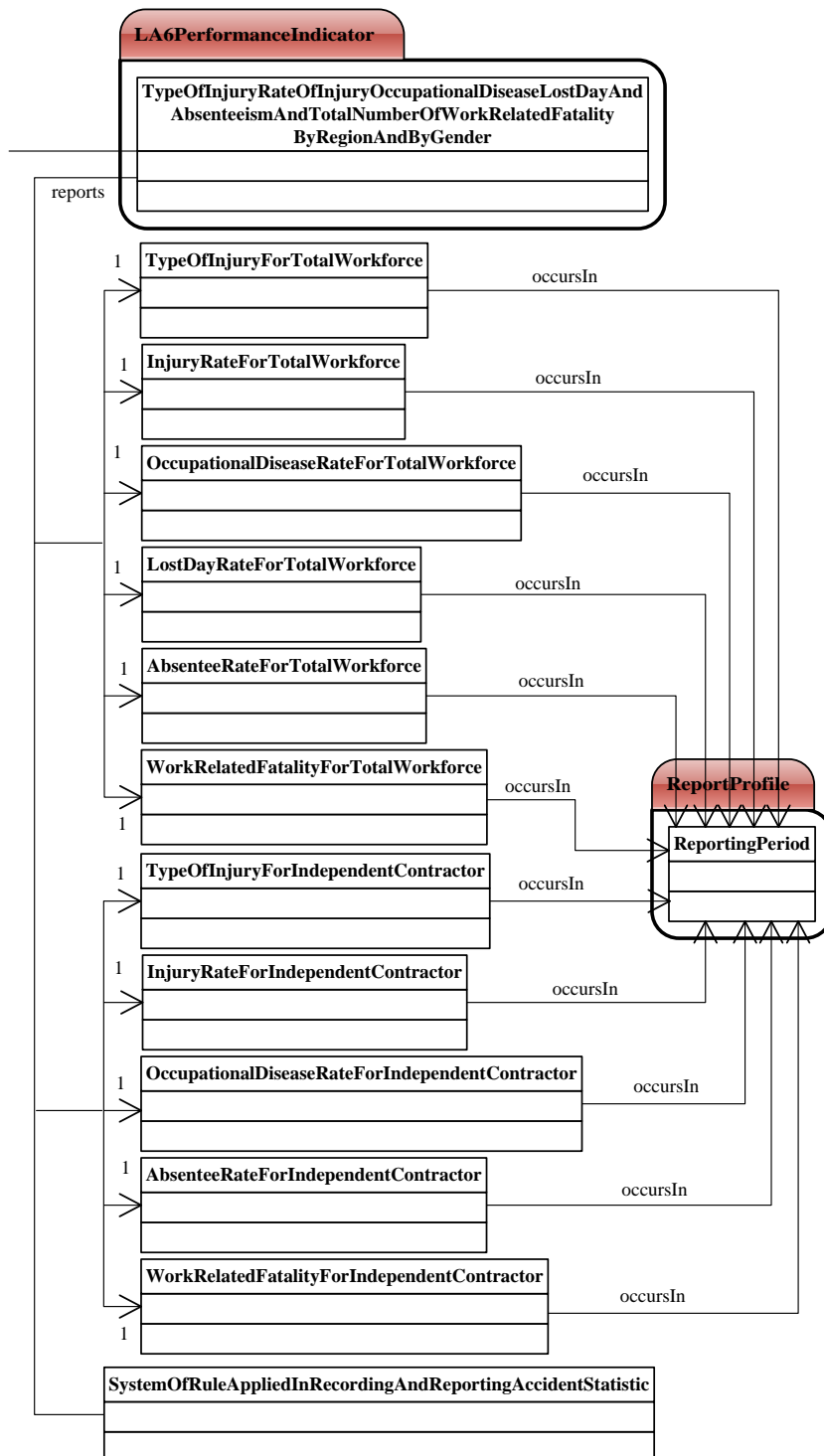


Figure 7.11 Ontology formalization for 'Type Of Injury And Rate Of Injury Occupational Disease Lost Day And Absenteeism And Total Number Of Work Related Fatality By Region And By Gender Indicator' class

7.2.1.3.3. Ontology for ‘Worker With High Incidence Or High Risk Of Disease Related To Worker Occupation Indicator’ class/ LA7

It concerns organizations working in countries with a high risk or incidence of communicable diseases and high incidence of specific diseases .The organization is required to report the possibility of its workers having a communicable diseases or there being a high risk of specific diseases (Global Reporting Initiative 2013b, 155). The ontology formalization for this indicator is shown in Figure 7.12.

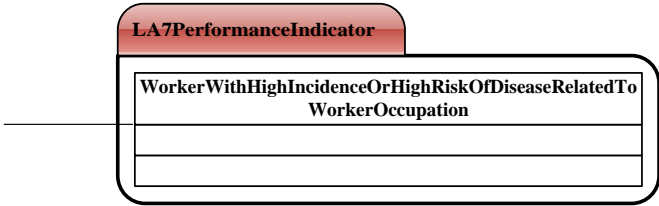


Figure 7.12 Ontology for ‘Worker With High Incidence Or High Risk Of Disease Related To Worker Occupation Indicator’ class

7.2.1.3.4. Ontology for ‘Health And Safety Topic Covered In Formal Agreement With Trade Union Indicator’ class/ LA8

It identifies whether the organization involved in local or global agreements with trade unions and the extent and coverage of health and safety topics included these agreements . The class that relates to this indicator class is ‘Formal Agreement With Trade Union’. The last class is the super-class which has two sub-classes that inherit datatype property of the super-class. It is signed by the ‘Organization’ class in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 156). The ontology formalization for this indicator is shown in Figure 7.13. The data properties can be found in Table 8.163.

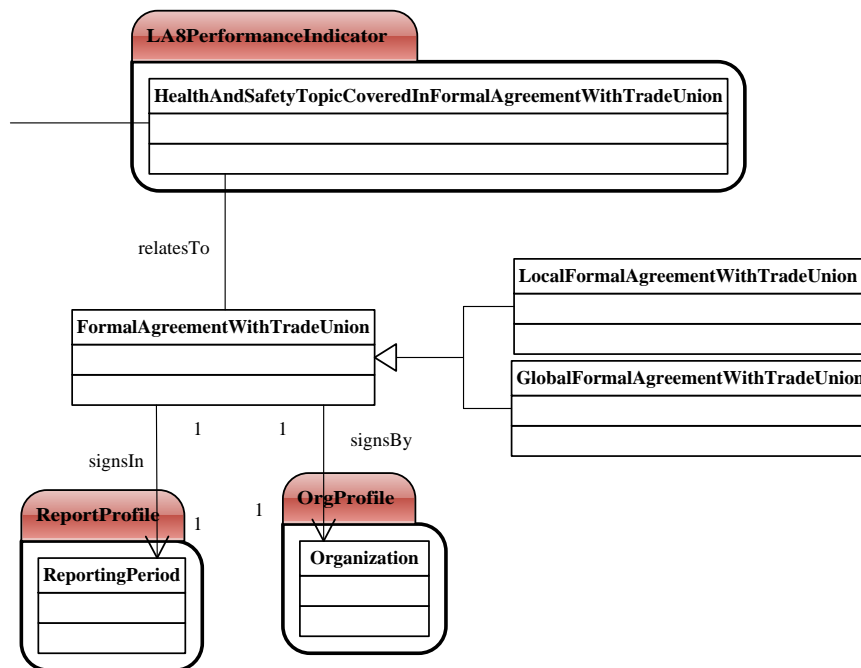


Figure 7.13 Ontology formalization for ‘Health and Safety Topic Covered In Formal Agreement With Trade Union Indicator’ class

7.2.1.4. Ontology for ‘Training And Education Aspect’ class

This is the third Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class within the ‘Social Category’ class. This Aspect class refers to “annual training by gender and employee category” (English and K.Schooley 2014). There are generic DMAs and three indicators related to this Aspect LA9 to LA11 as shown in Figure 7.14.

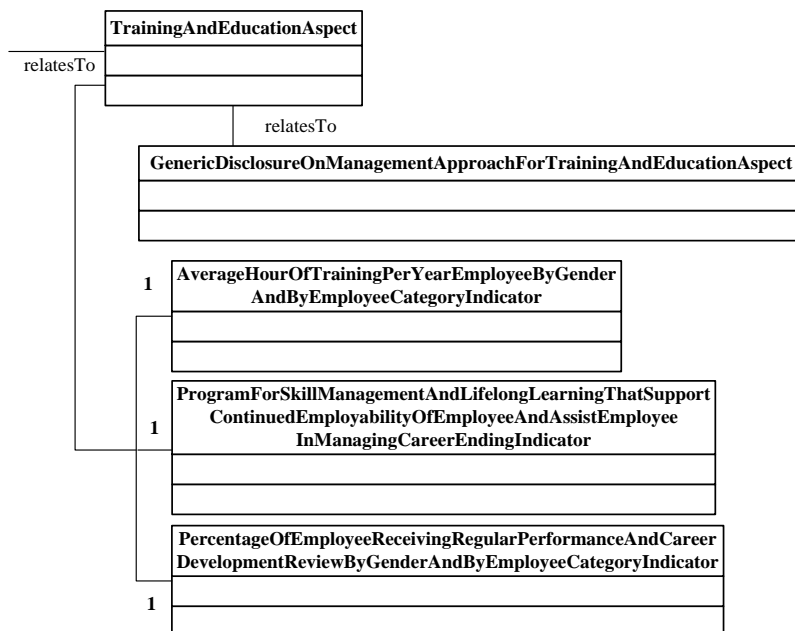


Figure 7.14 Ontology formalization for ‘Training And Education Aspect’ class

7.2.1.4.1. Ontology for ‘Average Hour Of Training Per Year Per Employee By Gender And By Employee Category Indicator’ class/ LA9

It relates to training hours per year per employee by gender and by employee category . The classes that relate to this indicator class are: ‘Employment Training by Gender’ and ‘Employee Training By Category’ which is trained in the ‘Reporting Period’ class. Both related class should match the ‘Employment Overview’ class (Global Reporting Initiative 2013b, 158-159). The ontology formalization for this indicator is shown in Figure 7.15. The data properties can be found in Tables 8.164 to 8.165.

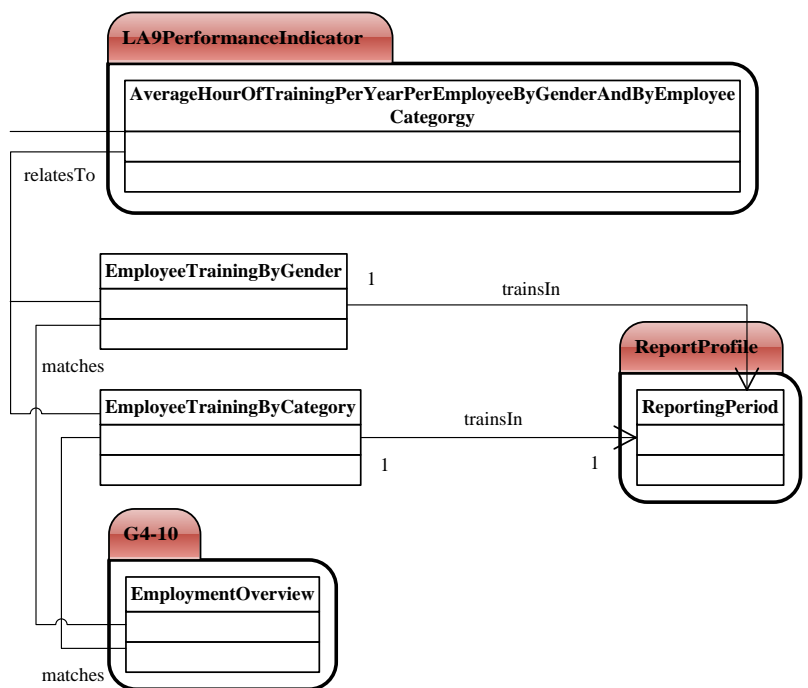


Figure 7.15 Ontology formalization for ‘Average Hour Of Training Per Year Employee By Gender And By Employee Category Indicator’ class

7.2.1.4.2. Ontology for ‘Program For Skill Management And Lifelong Learning That Support Continued Employability Of Employee And Assist Employee In Managing Career Ending Indicator’ class/ LA10

It represents employee training programs and transitional assistance programs provided to support retired or terminated employees . The classes that relate to this indicator class are: ‘Employee Training Program’ to upgrade employee skills, and ‘Transitional Assistance Program’ to support employees who are retiring or who have been terminated (Global Reporting Initiative 2013b, 160). The ontology formalization for this indicator is shown in Figure 7.16. The data property can found in Tables 8.165 to 8.167.

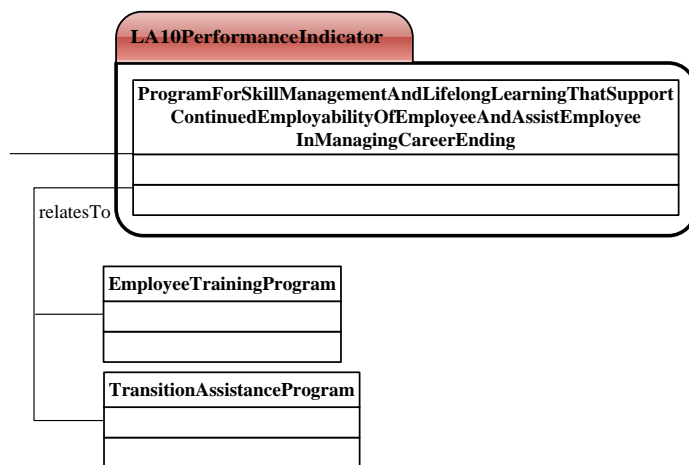


Figure 7.16 Ontology formalization for ‘Program For Skill Management And Lifelong Learning That Support Continued Employability Of Employee And Assist Employee In Managing Career Ending Indicator’ class

7.2.1.4.3. Ontology for ‘Percentage Of Employee Receiving Regular Performance And Career Development Review By Gender And By Employee Category Indicator’ class/ LA11

It refers to employees who received a regular performance and career development reviews by gender and employee category . The classes that relate to this indicator class are ‘Employee Who Received Regular Performance and Career Development Review By Gender’ which matches ‘Employment Overview’ class and the ‘Employee Who Received Regular Performance and Career Development Review By Employee Category’ class which matches the ‘Employee Category’ class. Both the related classes are received in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 161). The ontology formalization for this indicator is shown in Figure 7.17. The data property can be found in Table 8.168.

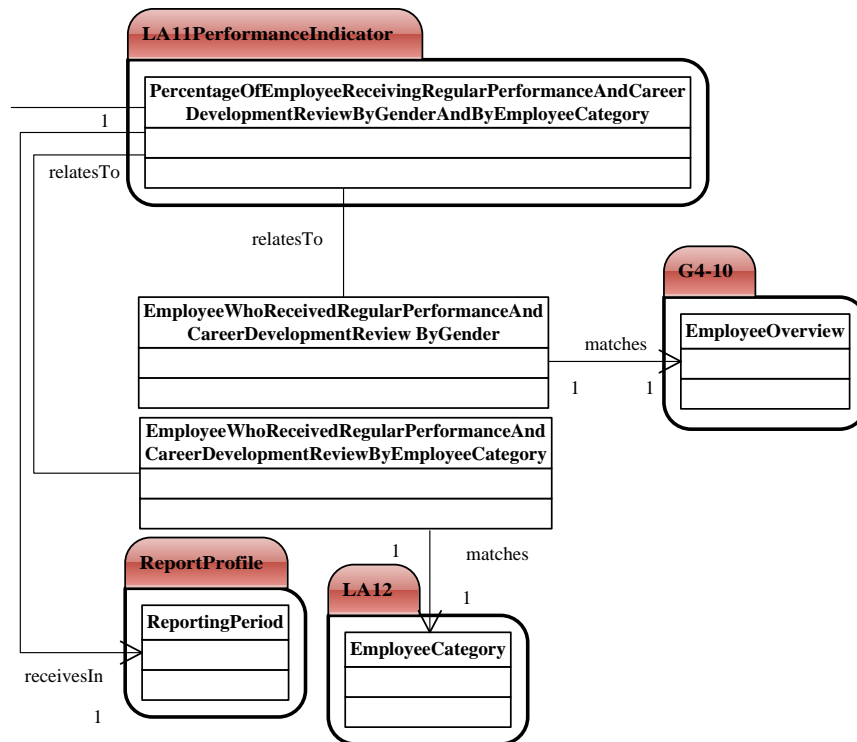


Figure 7.17 Ontology formalization for ‘Percentage Of Employee Receiving Regular Performance And Career Development Review By Gender And By Employee Category Indicator’ class

7.2.1.5. Ontology for ‘Diversity And Equal Opportunity Aspect’ class

This is the fifth Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class within ‘Social Category’ class. This Aspect class concerns “employees by gender, age, and minority group” (English and K.Schooley 2014). This class Aspect has generic DMA and one indicator class LA12 as shown in Figure 7.18.

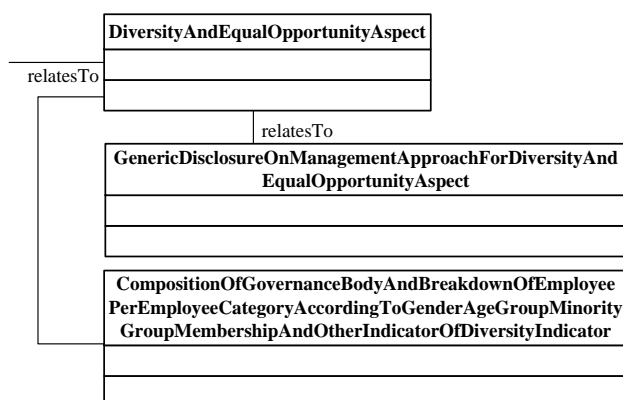


Figure 7.18 Ontology formalization for ‘Diversity And Equal Opportunity Aspect’ class

7.2.1.5.1. Ontology for ‘Composition Of Governance Body And Breakdown Of Employee Per Employee Category According To Gender Age Group Minority Group Membership And Other Indicator Of Diversity Indicator’ class/ LA12

It relates to individuals within organization’s governance bodies and employees per employee category in diversity categories of gender, age group, minority groups and other indicators of diversity . The classes that relate to this indicator class are: ‘Individual Within Governance Body’, and ‘Employee Category’. The first related class is a super-class for the following sub-classes: ‘Individual Within Governance Body By Gender’, ‘Individual Within Governance Body By Age Group’, ‘Individual Within Governance Body By Minority Group’, and ‘Individual Within Governance Body By Other Indicator Of Diversity Where Relevant’ because they inherit the datatype properties of the super-class (percentage of individuals or employees who comprise governance bodies) which is in the ‘Organization’ class. The second related class is the ‘Employee Category’ class which matches the ‘Employment Overview’ class. It is also the super-class for the following sub-classes: ‘Employee Category By Gender’, ‘Employee Category By Age Group’, ‘Employee Category By Minority Group’, and ‘Employee Category By Other Indicator Of Diversity Where Relevant’ because they inherit the datatype properties of the super-class the (percentage of employees per employee category) (Global Reporting Initiative 2013b, 163). The ontology formalization for this indicator is shown in Figure 7.19. The data properties can be found in Tables 8.169 to 8.176.

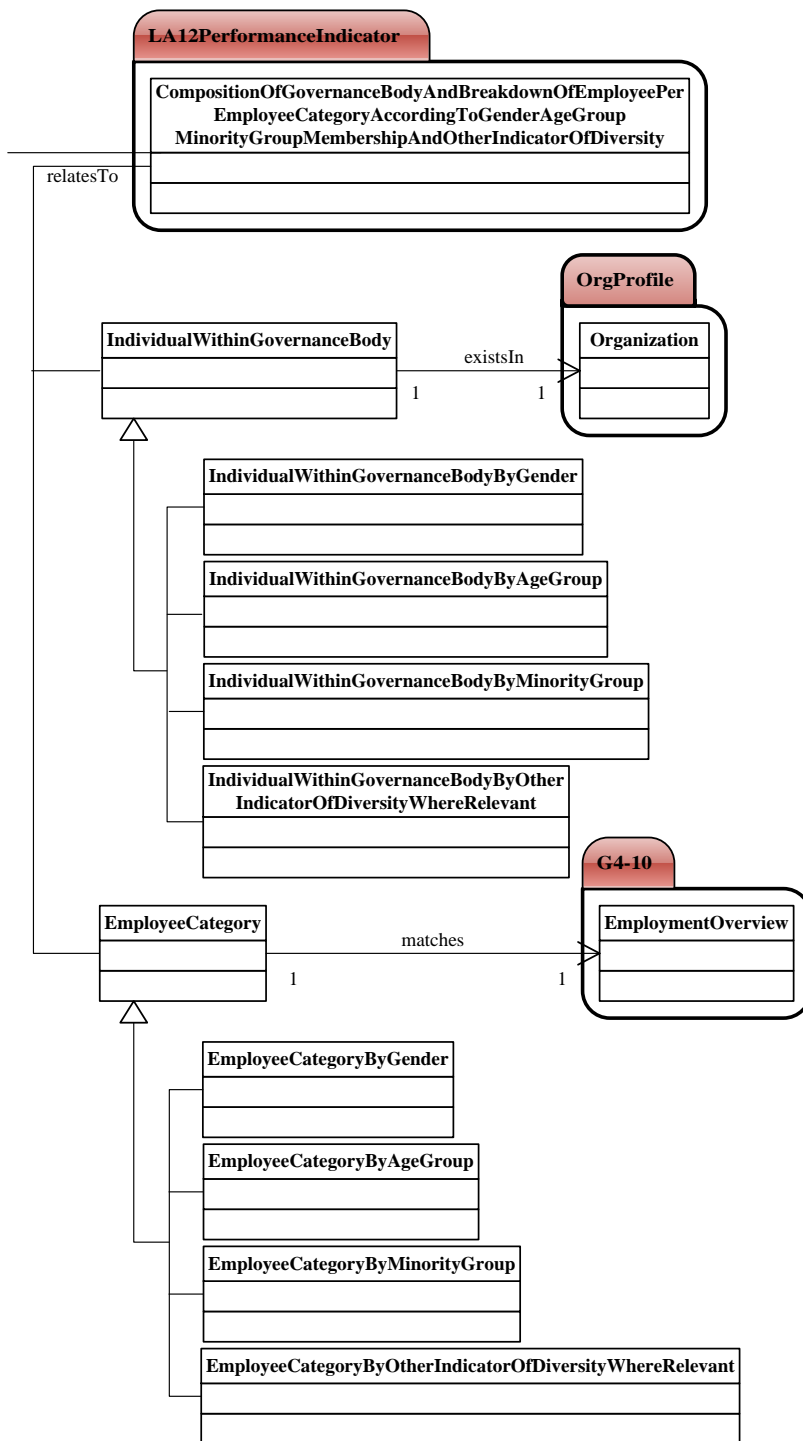


Figure 7.19 Ontology for 'Composition Of Governance Body And Breakdown Of Employee Per Employee Category According To Gender Age Group Minority Group Membership And Other Indicator Of Diversity Indicator' class

7.2.1.6. Ontology for 'Equal Remuneration For Woman And Man Aspect' class

This is the sixth Aspect that belongs to the 'Labor Practice and Decent Work Aspect' class within 'Social Category' class. This Aspect class focuses on "remuneration by gender" (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there is only one indicator that relates to this Aspect LA13 as shown in Figure 7.20.

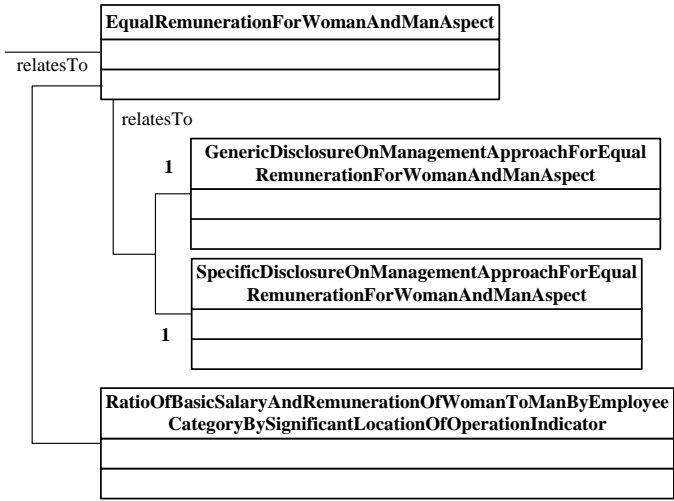


Figure 7.20 Ontology formalization for 'Equal Remuneration For Woman and Man Aspect' class

7.2.1.6.1. Ontology for 'Ratio Of Basic Salary And Remuneration Of Woman To Man By Employee Category By Significant Location Of Operation Indicator' class/ LA13

It relates to basic salary and remuneration for women and for men in each employee category. The class that relates to this indicator class is the 'Employee Category' which matches the 'Employment Review' class. In addition, it is required to report the ratio of the basic salary and remuneration of women to men in each employee category who are employed in the 'Location Of Operation' class (Global Reporting Initiative 2013b, 166). The ontology formalization for this indicator is indicated in Figure 7.21. The data property can be found in Table 8.177 and Table 8.178.

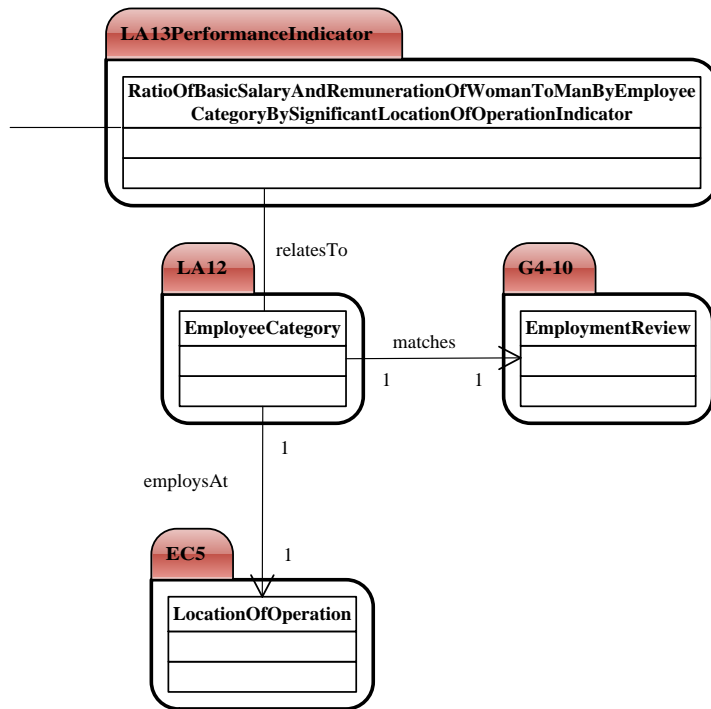


Figure 7.21 Ontology for ‘Ratio Of Basic Salary and Remuneration Of Woman To Man By Employee Category By Significant Location Of Operation Indicator’ class

7.2.1.7. Ontology for ‘Supplier Assessment For Labor Practice Aspect’ class

This is the seventh Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class within the ‘Social Category’ class. This Aspect class centers on “suppliers screened for labor practices” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there are two indicators that relate to this Aspect LA14 to LA15 as presented in Figure 7.22.

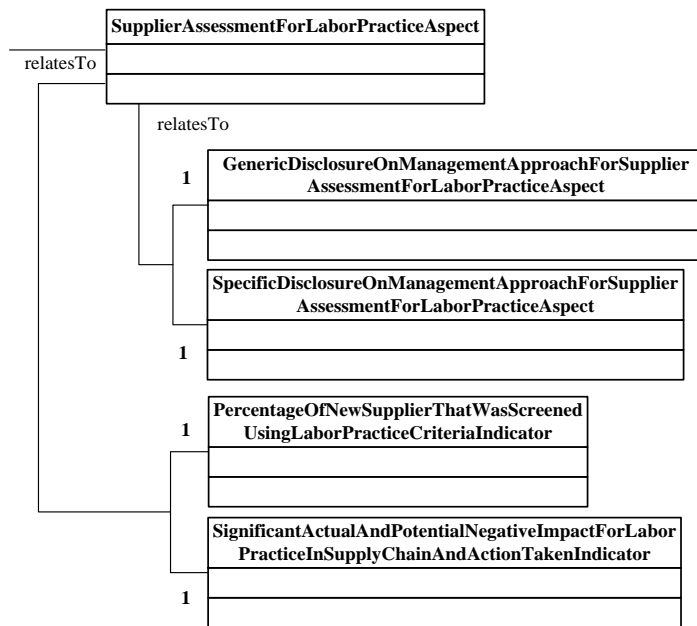


Figure 7.22 Ontology formalization for ‘Supplier Assessment For Labor Practice Aspect’ class

7.2.1.7.1. Ontology for ‘Percentage Of New Supplier That Was Screened Using Labour Practice Criteria Indicator’ class/ LA14

It identifies new suppliers that contract with the organization and new suppliers that investigated using labor practices criteria. This indicator class is calculated by dividing the class ‘Total Number Of New Supplier That Was Screened Using Labor Practice Criteria’ which is the numerator of ‘Total Number Of New Supplier Contracting With Org’ class (Global Reporting Initiative 2013b, 169). The ontology formalization for this indicator is shown in Figure 7.23.

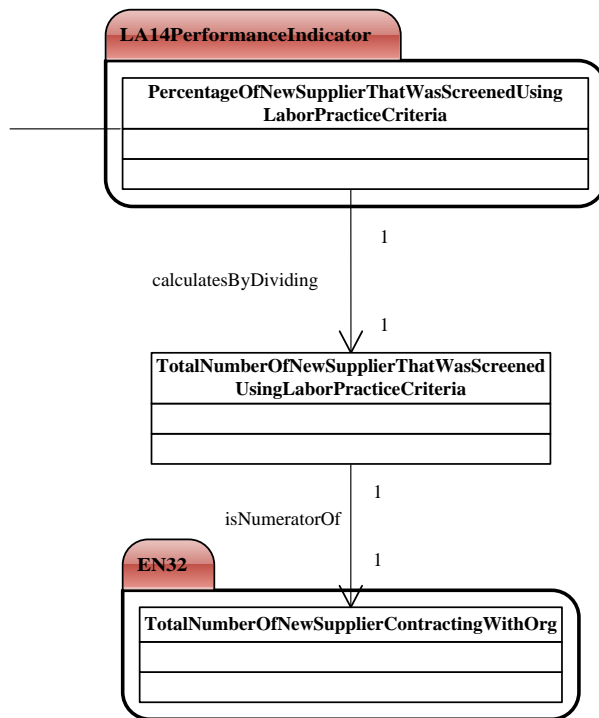


Figure 7.23 Ontology formalization for ‘Percentage Of New Supplier That Was Screened Using Labor Practice Criteria Indicator’ class

7.2.1.7.2. Ontology for ‘Significant Actual And Potential Negative Impact For Labor Practice In Supply Chain And Action Taken Indicator’ class/ LA15

It identifies and assess significant actual and potential negative impacts for labor practices in the supply chain. The classes that relate to this indicator class are: ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Impact For Labor Practice As Result Of Assessment’, and ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Impact For Labor Practice As Result Of Assessment and Action Taken’. Firstly, the first related class is calculated by dividing the class ‘Supplier Subject To Impact Assessment For Labor Practice’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Impact For Labor Practice’. Secondly, the second related class is calculated by dividing the class ‘Action Taken Toward Supplier Identified Having Significant Actual and Potential Negative Impact For Labor Practice’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Impact For Labor Practice’ (Global Reporting Initiative 2013b, 170). The ontology formalization for this indicator is shown in Figure 7.24.

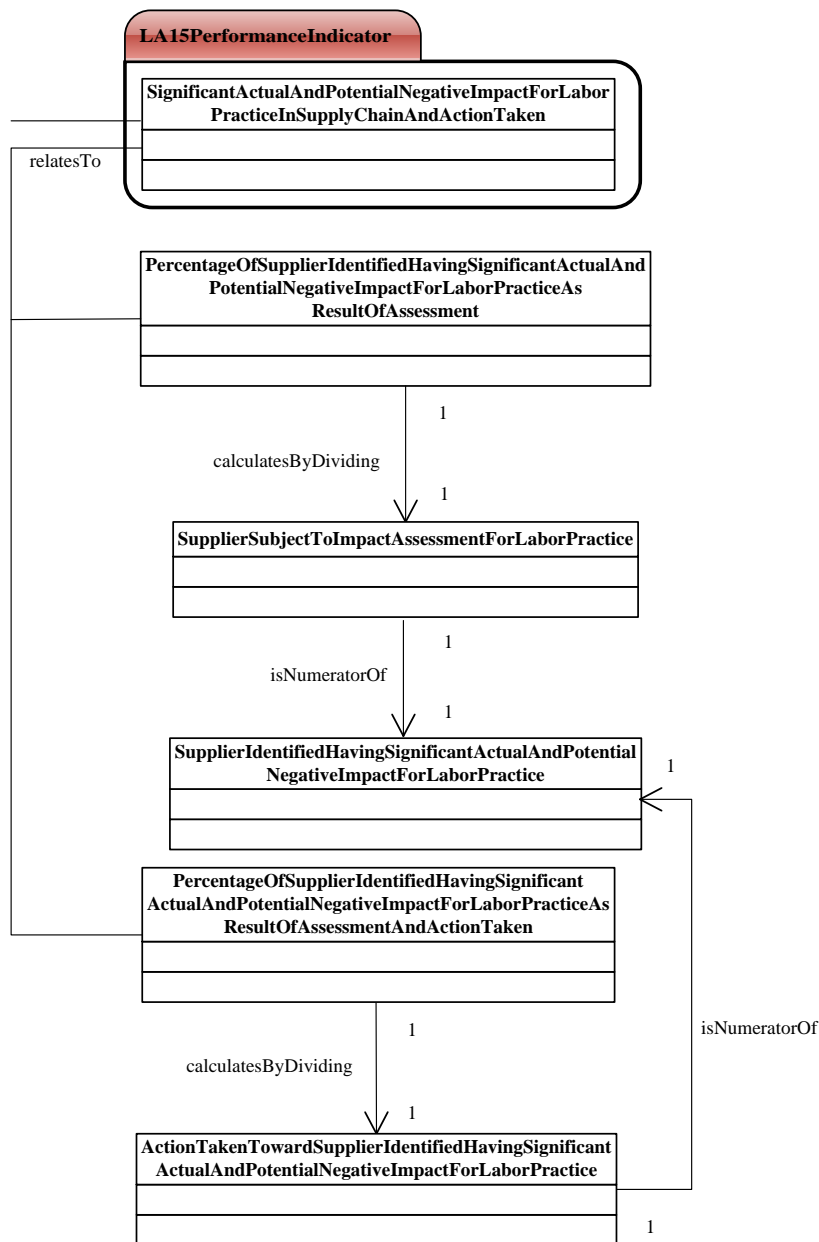


Figure 7.24 Ontology for ‘Significant Actual And Potential Negative Impact For Labor Practice In Supply Chain And Action Taken Indicator’ class

7.2.1.8. Ontology for ‘Labor Practice Grievance Mechanism Aspect’ class

This is the eighth Aspect that belongs to the ‘Labor Practice and Decent Work Aspect’ class within the ‘Social Category’ class. This Aspect class highlights on “labor practice grievance” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there is only one indicator that relates to this Aspect LA16 as shown in Figure 7.25.

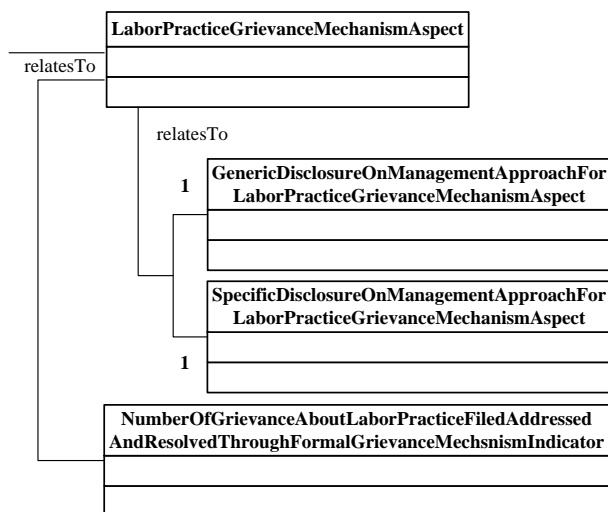


Figure 7.25 Ontology formalization for ‘Labor Practice Grievance Mechanism Aspect’ class

7.2.1.8.1. Ontology for ‘Number Of Grievance About Labor Practice Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class/ LA16

It refers to existing formal grievance mechanisms about labor practice managed by organization or by an external party. It is required to identify existing formal grievance mechanism about labor practices. In addition, it is required that the identified grievances be reported for the following classes: ‘Grievance Labor Practice Filed’, ‘Grievance Labor Practice Addressed’, and ‘Grievance Labor Practice Resolved’ which is occurred in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 172). The ontology formalization for this indicator is presented in Figure 7.26. The data properties can be found in Tables 8.179 to 8.181.

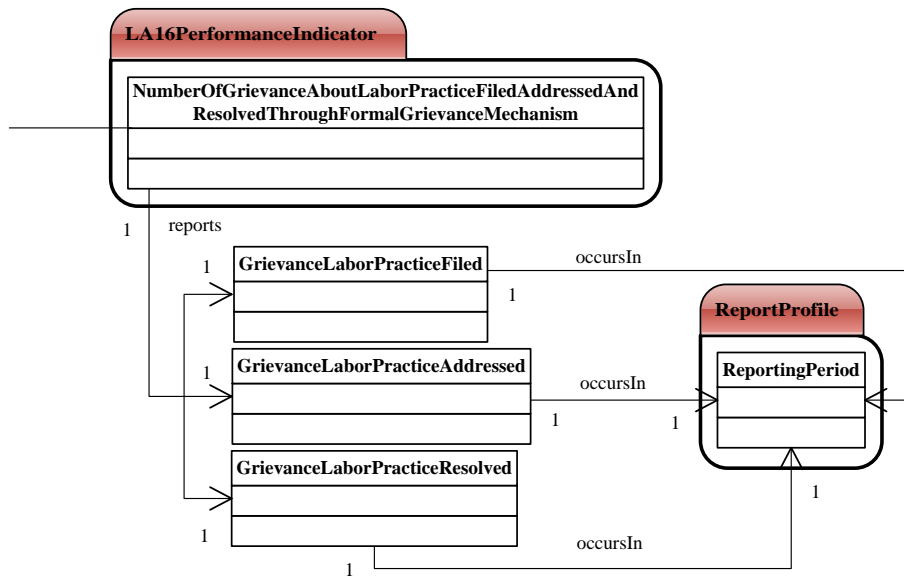


Figure 7.26 Ontology formalization for ‘Number Of Grievance About Labor Practice Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class

7.2.2. Ontology for ‘Human Right Aspect’ class

There are ten Aspects as classes in the ‘Human Right Aspect’ class as shown in Figure 7.27 which They are: ‘Investment Aspect’, ‘Non-Discrimination Aspect’, ‘Freedom Of Association and Collective Bargaining Aspect’, ‘Child Labor Aspect’, ‘Forced Or Compulsory Labor Aspect’, ‘Security Practice Aspect’, ‘Indigenous Right Aspect’, ‘Assessment Aspect’, ‘Supplier Human Right Assessment Aspect’, and ‘Human Right Grievance Mechanism Aspect’.

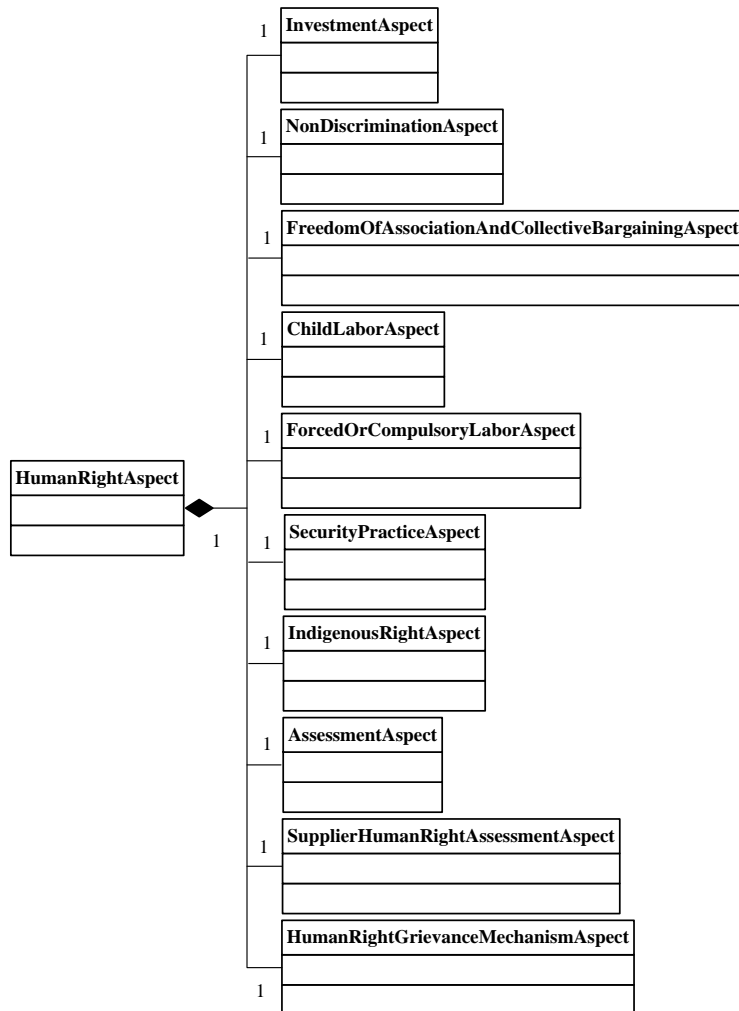


Figure 7.27 Ontology formalization for ‘Human Right Sub Category’ class

7.2.2.1. Ontology for ‘Investment Aspect’ class

This is the first Aspect that belongs to the ‘Human Right Aspect’ class within the ‘Social Category’ class. The concentration of this Aspect is on “investment agreements that include human rights clauses” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there are two indicators that relate to this Aspect HR1 and HR2 as shown in Figure 7.28.

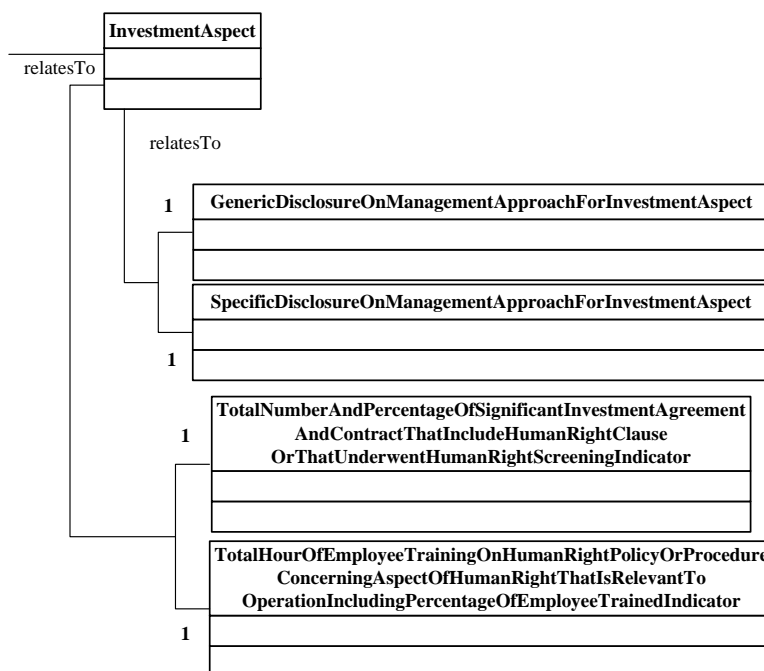


Figure 7.28 Ontology formalization for 'Investment Aspect' class

7.2.2.1.1. Ontology for 'Total Number And Percentage Of Significant Investment Agreement And Contract That Include Human Right Clause Or That Undergo Human Right Screening Indicator' class/ HR1

It identifies significant agreements and contracts that contain clauses on human rights. The classes that relate to this indicator class are: 'Significant Investment Agreement and Contract Finalized' which is finalized in the 'Reporting Period' class, 'Multiple Significant Investment Agreement and Contract With Same Partner', and 'Significant Investment Agreement and Contract' which is used by 'Organization' class (Global Reporting Initiative 2013b, 176). The ontology formalization for this indicator is presented in Figure 7.29.

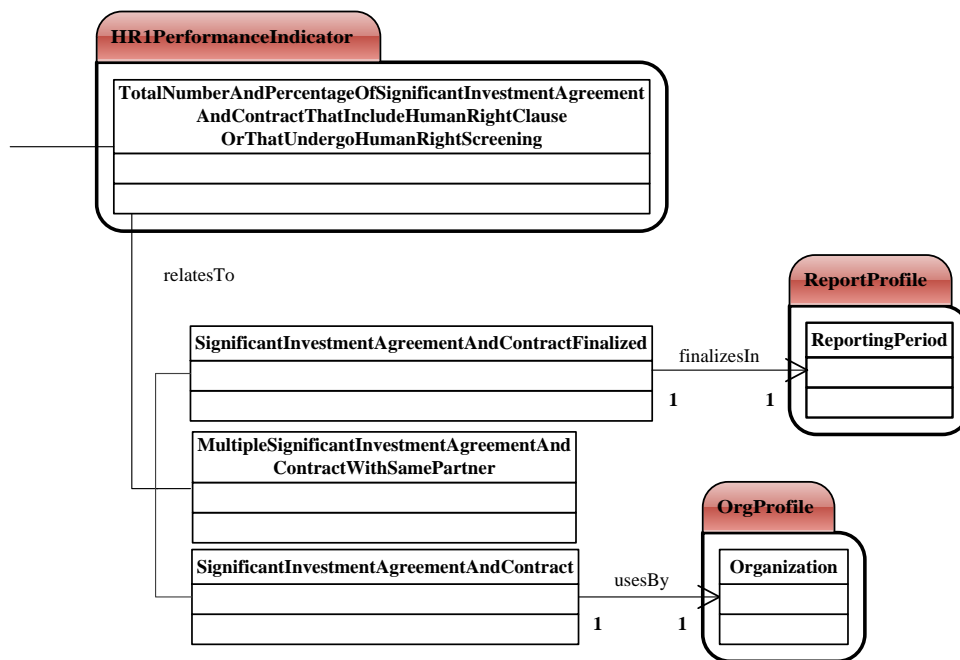


Figure 7.29 Ontology formalization for ‘Total Number And Percentage Of Significant Investment Agreement And Contract That Include Human Right Clause Or That Undergo Human Right Screening Indicator’ class

7.2.2.1.2. Ontology for ‘Total Hour Of Employee Training On Human Right Policy Or Procedure Concerning Aspect Of Human Right That Is Relevant To Operation Including Percentage Of Employee Trained Indicator’ class/ HR2

It refers to employees who have received formal training in the organization’s human rights policies or procedures. The class that relates to this indicator class is ‘Employee Received Formal Training’ which matches the ‘Employee Training By Gender’ class and the ‘Employee Training By Category’ class. Both of the latter classes should match ‘Employment Overview’ class which is employed by the ‘Organization’ class. The first related class focuses on ‘Training On Human Right Policy Or Procedure Concerning Aspect Of Human Right That Is Relevant To Operation’ class which is received in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 177). The ontology formalization for this indicator is presented in Figure 7.30. The data properties can be found in Table 8.182.

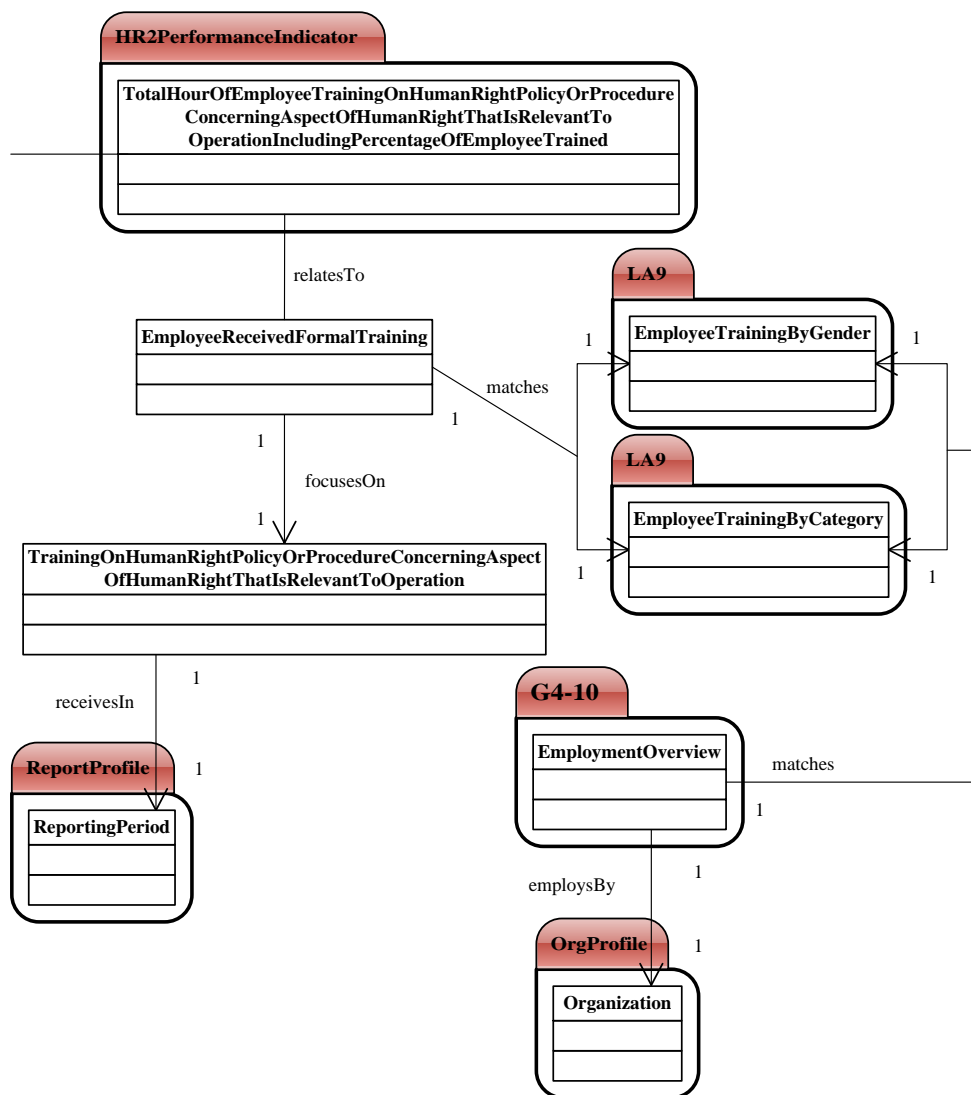


Figure 7.30 Ontology formalization for ‘Total Hour Of Employee Training On Human Right Policy Or Procedure Concerning Aspect Of Human Right That Is Relevant To Operation Including Percentage Of Employee Trained Indicator’ class

7.2.2.2. Ontology for ‘Non Discrimination Aspect’ class

This is the second Aspect that belongs to the ‘Human Right Aspect’ class within the ‘Social Category’ class. The essence of this Aspect is “incidents of discrimination” (English and K.Schooley 2014). There is a generic DMA and only one indicator that relates to this Aspect HR3 as indicated in Figure 7.31.

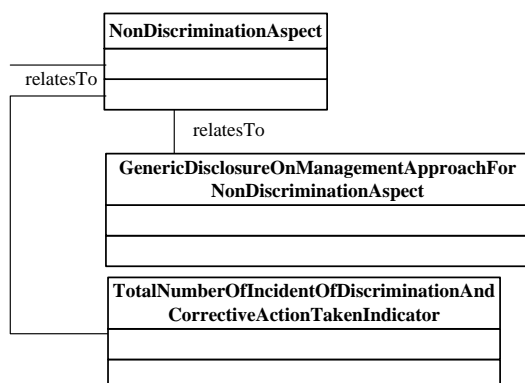


Figure 7.31 Ontology formalization for ‘Non Discrimination Aspect’ class

7.2.2.2.1. Ontology for ‘Total Number Of Incident Of Discrimination And Corrective Action Taken Indicator’ class/ HR3

It concerns incidents of discrimination and the status of each incident. The class that relates to this indicator class is ‘Incident Of Discrimination’ in terms of total number in the ‘Reporting Period’ class for the following sub-classes: ‘Incident Of Discrimination On Ground Of Race’, ‘Incident Of Discrimination On Ground Of Color’, ‘Incident Of Discrimination On Ground Of Sex’, ‘Incident Of Discrimination On Ground Of Religion’, ‘Incident Of Discrimination On Ground Of Political Opinion’, ‘Incident Of Discrimination On Ground Of National Extraction’, ‘Incident Of Discrimination On Ground Of Social Origin’, and ‘Incident Of Discrimination On Ground Of Other Relevant Form Of Discrimination’. In addition, it is required to report the ‘Status Of Incident Of Discrimination’ class, and ‘Action Taken Against Incident Of Discrimination’ class (Global Reporting Initiative 2013b, 179). The ontology formalization for this indicator is presented in Figure 7.32. The data properties can be found in Tables 8.183 to 8.185.

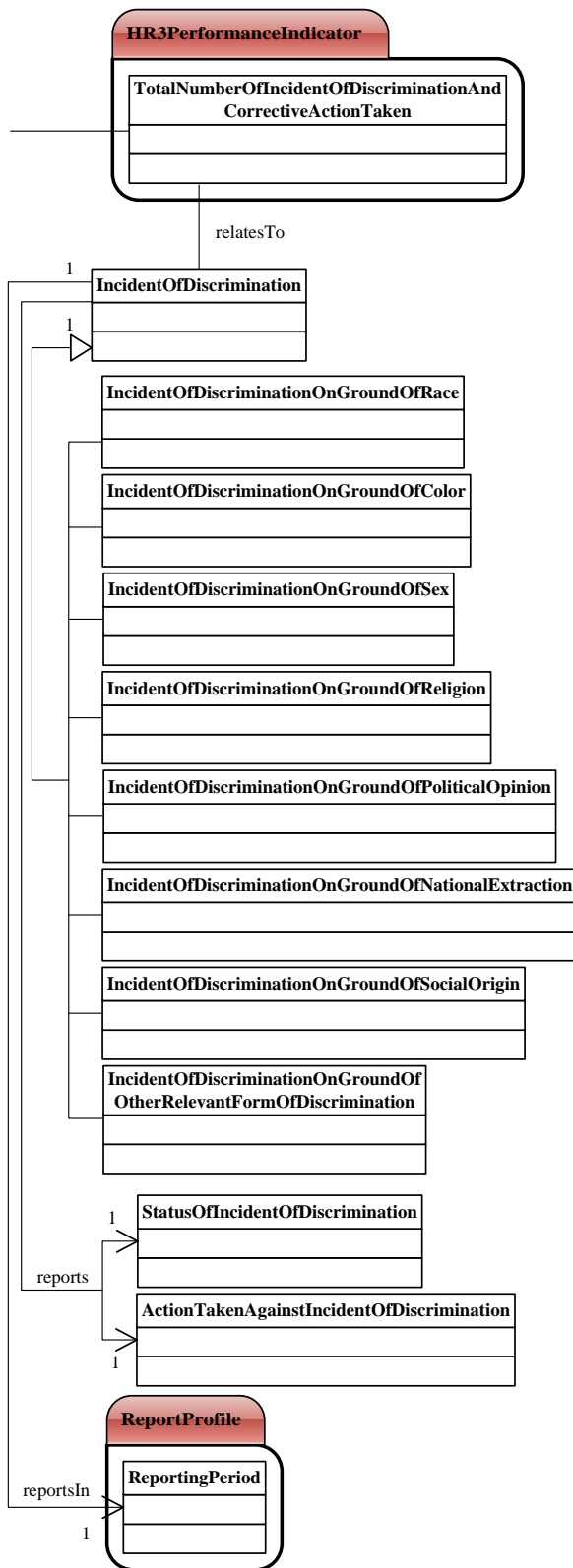


Figure 7.32 Ontology formalization for 'Total Number Of Incident Of Discrimination And Corrective Action Taken Indicator' class

7.2.2.3. Ontology for ‘Freedom Of Association And Collective Bargaining Aspect’ class

This is the third Aspect that belongs to ‘Human Right Aspect’ class within the ‘Social Category’ class. This Aspect class is focused on “operations and suppliers at risk for violating right to exercise freedom of association” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there is only one indicator that relates to this Aspect HR4 as presented in Figure 7.33.

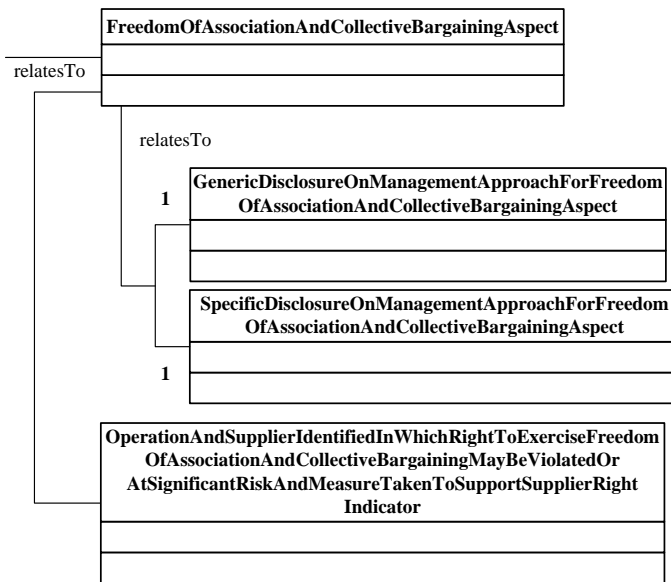


Figure 7.33 Ontology formalization for ‘Freedom Of Association And Collective Bargaining Aspect’ class

7.2.2.3.1. Ontology for ‘Operation And Supplier Identified In Which Right To Exercise Freedom Of Association And Collective Bargaining May Be Violated Or At Significant Risk And Measure Taken To Support Operation And Supplier Right Indicator’ class/ HR4

It relates to operations and suppliers identifies in which employee rights to exercise freedom of association or collective bargaining and measures taken by the organization intended to support rights to freedom of association and collective bargaining. The classes that relate to this indicator class are: ‘Operation and Supplier Identified In Which Employee Right To Exercise Freedom Of Association Or Collective Bargaining’, and ‘Measure Taken’. The first related class identifies ‘Employee Right’ class. The second related class is taken by the ‘Organization’ class and it takes in the ‘Reporting Period’ class to support the ‘Employee Right’ class. The ontology formalization for this indicator is indicated in Figure 7.34.

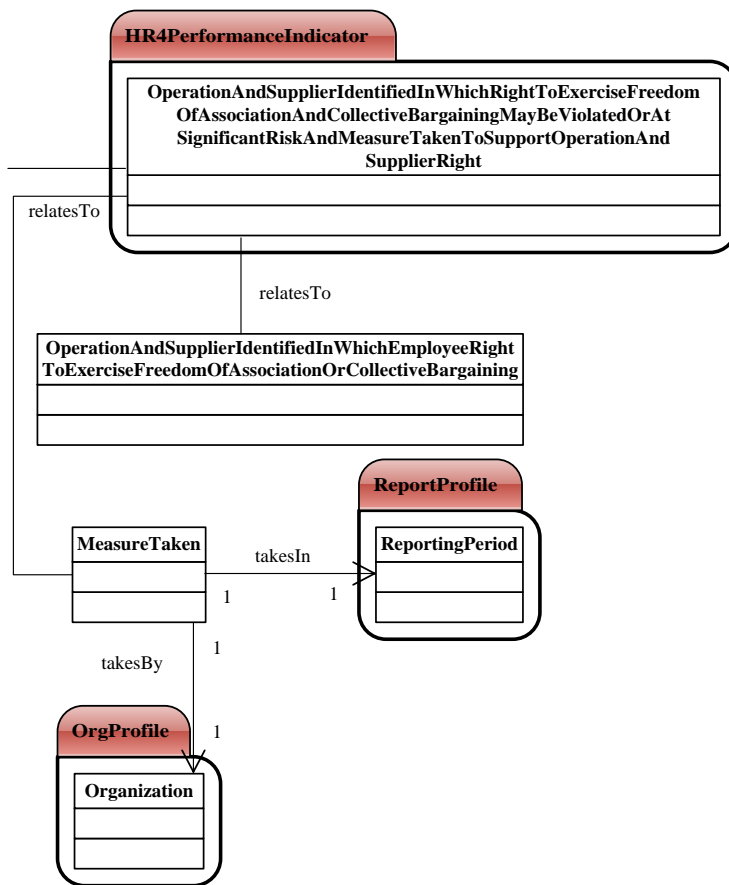


Figure 7.34 Ontology formalization for ‘Operation And Supplier Identified In Which Right To Exercise Freedom Of Association And Collective Bargaining May Be Violated Or At Significant Risk And Measure Taken To Support Supplier Right Indicator’ class

7.2.2.4. Ontology for ‘Child Labor Aspect’ class

This is the fourth Aspect that belongs to the ‘Human Right Aspect’ class within ‘Social Category’ class. It highlights the “risk for incidents of child labor” (English and K.Schooley 2014). There is a generic DMA and only one indicator that relates to this Aspect HR5 as presented in Figure 7.35.

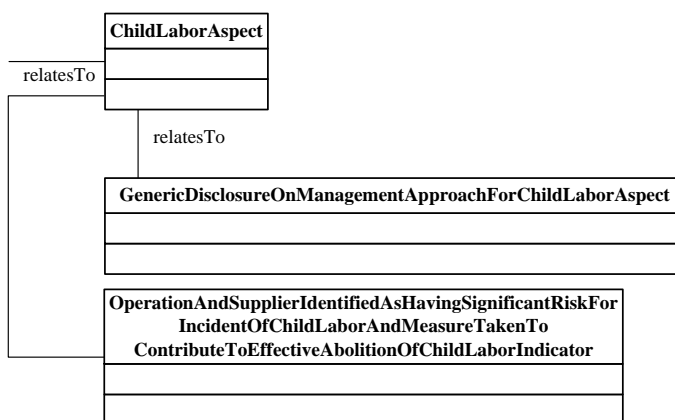


Figure 7.35 Ontology formalization for ‘Child Labor Aspect’ class

7.2.2.4.1. Ontology for ‘Operation And Supplier Identified As Having Significant Risk For Incident Of Child Labor And Measure Taken To Contribute To Effective Abolition Of Child Labor Indicator’ class/ HR5

It identifies operations and suppliers considered to have significant risk for incidents of child labor or young workers and the measures taken to abolish of child labor. The classes that relate to this indicator class are: ‘Operation and Supplier Considered To Have Significant Risk For Incident Of Child Labor’, ‘Operation and Supplier Considered To Have Significant Risk For Incident Of Young Worker Exposed To Hazardous Work’, and ‘Measure Taken To Abolish Child Labor’. Firstly, it is required to report for the related classes. In addition, it is required to report for class ‘Operation and Supplier Considered To Have Significant Risk For Incident of Child Labor’ in terms of types of operations and suppliers, and countries or geographical areas with operations and suppliers considered at risk. Finally, the class ‘Measure Taken To Abolish Child Labor’ is taken in the ‘Reporting Period’ class by ‘Organization’ class which takes for ‘Operation and Supplier Considered To Have Significant Risk For Incident of Child Labor’ class (Global Reporting Initiative 2013b, 183). The ontology formalization for this indicator is given in Figure 7.36.

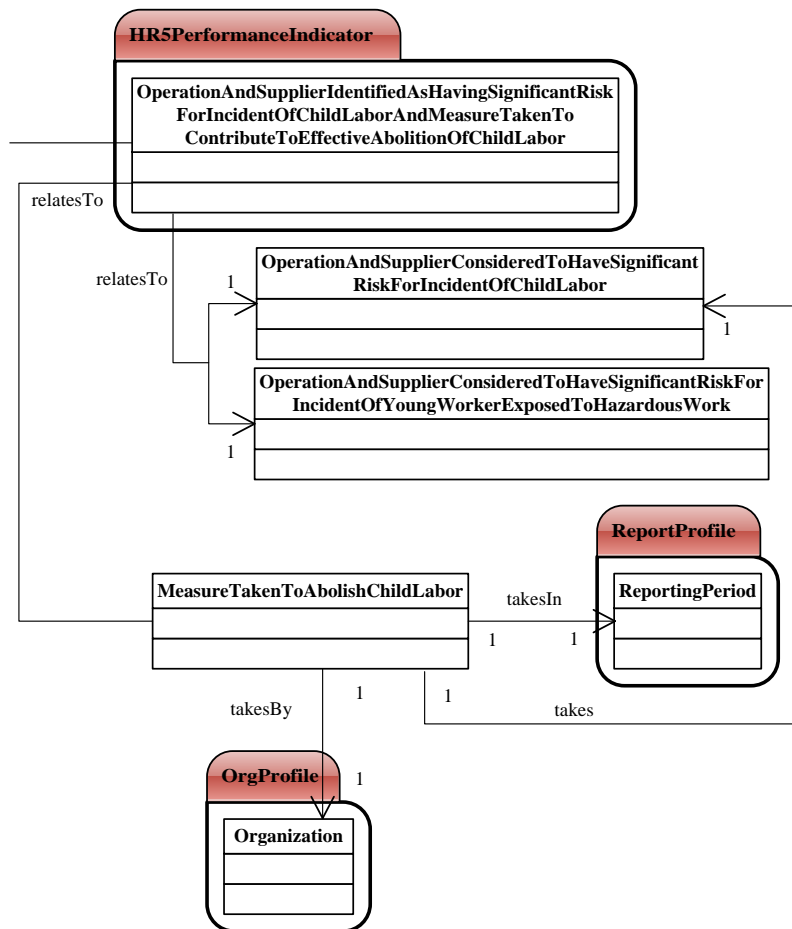


Figure 7.36 Ontology formalization for 'Operation And Supplier Identified As Having Significant Risk For Incident Of Child Labor And Measure Taken To Contribute To Effective Abolition Of Child Labor Indicator' class

7.2.2.5. Ontology for 'Forced Or Compulsory Labor Aspect' class

This is the fifth Aspect that belongs to the 'Human Right Aspect' class within 'Social Category' class. It focuses on "risk for incidents of forced or compulsory labor" (English and K.Schooley 2014). There is a generic DMA and only one indicator that relates to this Aspect HR6 as presented in Figure 7.37.

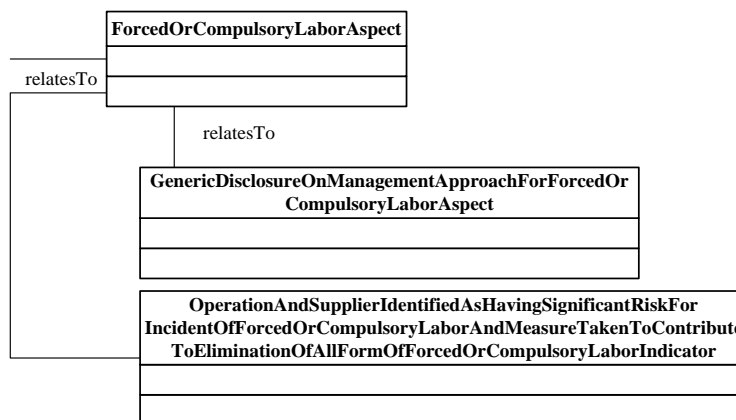


Figure 7.37 Ontology formalization for ‘Forced Or Compulsory Labor Aspect’ class

7.2.2.5.1. Ontology for ‘Operation And Supplier Identified As Having Significant Risk For Incident Of Forced Or Compulsory Labor And Measure To Contribute To Eliminate Of All Form Of Forced Or Compulsory Labor Indicator’ class/ HR6

It refers to operations and suppliers considered to have significant risk for incidents of forced or compulsory labor and measures taken to eliminate of all forms of forced or compulsory labor. The classes that relate to this indicator class are: ‘Operation and Supplier Considered To Have Significant Risk For Incident Of Forced Or Compulsory Labor’, and ‘Measure Taken To Contribute To Eliminate All Form Of Forced Or Compulsory Labor’. The first related class reflects the approach to risk assessment of forced and compulsory labor of the ‘Organization’ class. It is required to report operations and suppliers that are considered to present a significant risk of incidents of forced or compulsory labor in terms of types of operations and suppliers and countries or geographical areas with operations and suppliers considered at risk. Secondly, it is required to report ‘Measure Taken To Contribute To Eliminate All Form Of Forced Or Compulsory Labor’ class which is taken by the ‘Organization’ class and it is taken in the ‘Reporting Period’ class to help eliminate all forms of forced or compulsory labor (Global Reporting Initiative 2013b, 185). The ontology formalization for this indicator is shown in Figure 7.38.

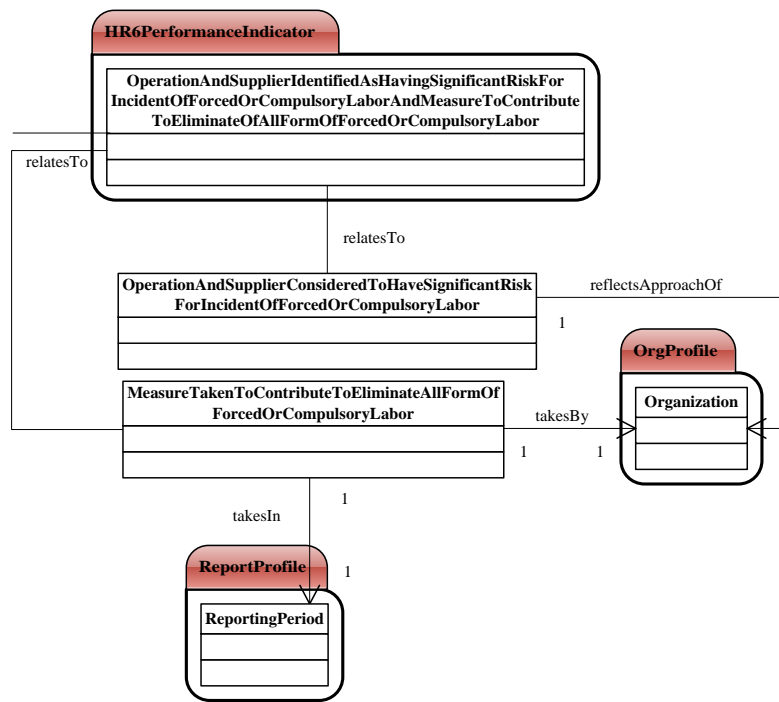


Figure 7.38 Ontology formalization for ‘Operation And Supplier Identified As Having Significant Risk For Incident Of Forced Or Compulsory Labor And Measure To Contribute To Eliminate Of All Form Of Forced Or Compulsory Labor Indicator’ class

7.2.2.6. Ontology for ‘Security Practice Aspect’ class

This is the sixth Aspect that belongs to the ‘Human Right Aspect’ class within ‘Social Category’ class. It centers on “personnel trained in human rights policies” (English and K.Schooley 2014). There is a generic DMA and only one indicator that relates to this Aspect HR7 as presented in Figure 7.39.

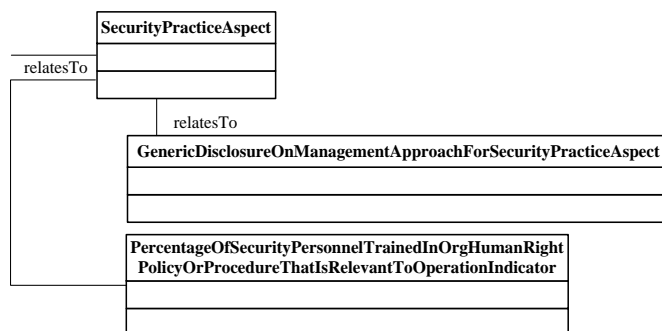


Figure 7.39 Ontology formalization for ‘Security Practice Aspect’ class

7.2.2.6.1. Ontology for ‘Percentage Of Security Personnel Trained In Org Human Right Policy Or Procedure That Is Relevant To Operation Indicator’ class/ HR7

It relates to security personnel receiving training in the organization human rights policies or procedures. The class that relates to this indicator class is: ‘Security Personnel’, who are employed by the ‘Organization’ class. It is required to identify the total number and percentage of security personnel who have received formal training on human rights policies or procedures (Global Reporting Initiative 2013b, 187). The ontology formalization for this indicator is presented in Figure 7.40. The data properties can be found in Table 8.186.

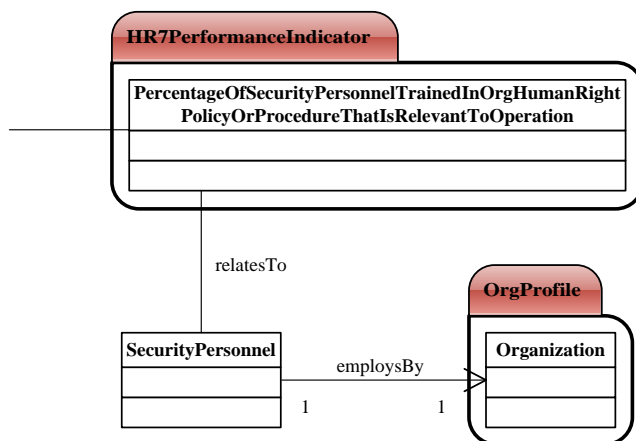


Figure 7.40 Ontology formalization for ‘Percentage Of Security Personnel Trained In Org Human Right Policy Or Procedure That Is Relevant To Operation Indicator’ class

7.2.2.7. Ontology for ‘Indigenous Right Aspect’ class

This is the seventh Aspect that belongs to the ‘Human Right Aspect’ class within ‘Social Category’ class. It concentrates on “violations of rights of indigenous peoples” (English and K.Schooley 2014). There is a generic DMA and only one indicator that relates to this Aspect HR8 as presented in Figure 7.41.

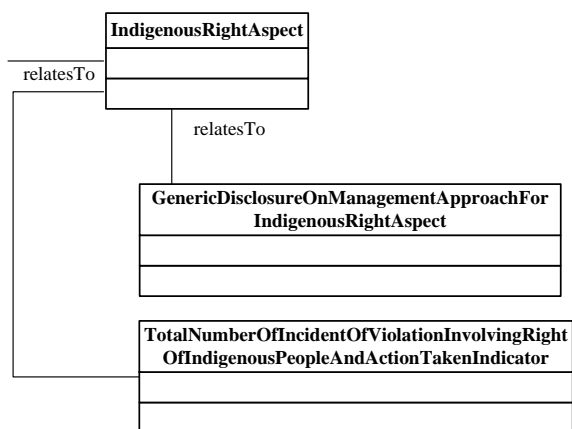


Figure 7.41 Ontology formalization for 'Indigenous Right Aspect' class

7.2.2.7.1. Ontology for 'Total Number Of Incident Of Violation Involving Right Of Indigenous People And Action Taken Indicator' class/ HR8

It identifies incidents involving indigenous people rights and the status of the incident and actions taken. The classes that relate to this indicator class are: 'Incident Involving Right Of Indigenous People', 'Status Of Incident Of Violation', and 'Action Taken Against Incident Of Violation' class. Firstly, it is required to report the total number of identified 'Incident Involving Right Of Indigenous People' have occurred in the 'Reporting Period' and which occurred by 'Organization' class. Secondly, it is required to report for 'Status Of Incident Of Violation' class and 'Action Taken Against Incident Of Violation' class (Global Reporting Initiative 2013b, 189). The ontology formalization for this indicator is shown in Figure 7.42. The data property can be found in Table 8.187 and Table 8.188.

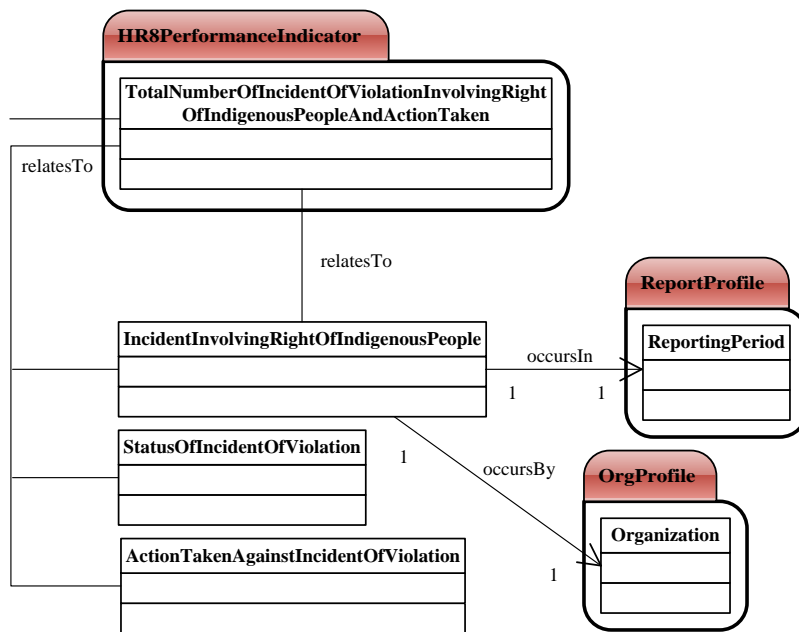


Figure 7.42 Ontology formalization for ‘Total Number Of Incident Of Violation Involving Right Of Indigenous People And Action Taken Indicator’ class

7.2.2.8. Ontology for ‘Assessment Aspect’ class

This is the eighth Aspect that belongs to the ‘Human Right Aspect’ class within ‘Social Category’ class. It focusses on “operations subject to human rights reviews”. There is a generic DMA and only one indicator that relates to this Aspect HR9 as presented in Figure 7.43.

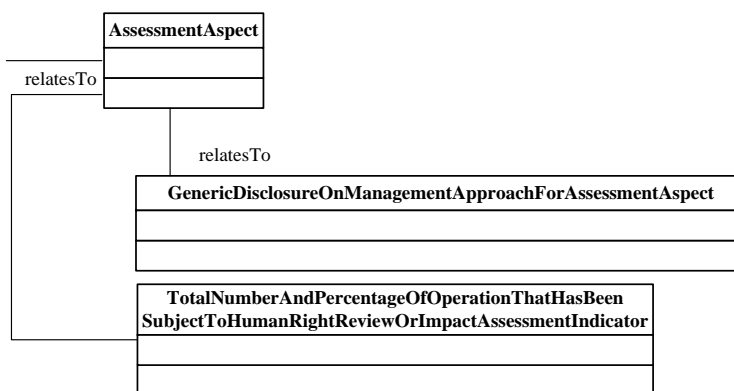


Figure 7.43 Ontology formalization for ‘Assessment Aspect’ class

7.2.2.8.1. Ontology for ‘Total Number And Percentage Of Operation That Has Been Subject To Human Right Review Or Impact Assessment Indicator’ class/ HR9

It signifies countries in which the organization operates, operations by country and operations subject to human rights reviews or human rights impact assessments by country. The classes that relate to this indicator class are: ‘Operation By country’ and ‘Operation Subject To Human Right Review Or Human Right Impact Assessment’. It is required to identify ‘Country’ class in which the ‘Organization’ class operates in order to present the ‘Operation By Country’ class (Global Reporting Initiative 2013b, 191). The ontology for this indicator is shown in Figure 7.44.

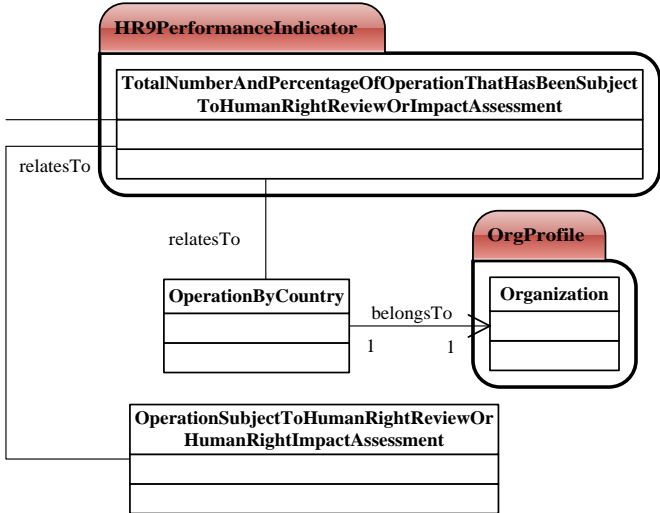


Figure 7.44 Ontology formalization for ‘Total Number And Percentage Of Operation That Has Been Subject To Human Right Review Or Impact Assessment

7.2.2.9. Ontology for ‘Supplier Human Right Assessment Aspect’ class

This is the ninth Aspect that belongs to the ‘Human Right Aspect’ class within ‘Social Category’ class. It emphasizes the “suppliers screened using human rights criteria”. There are generic and specific DMAs. In addition, there are two indicators that relate to this Aspect HR10 and HR11 as presented in Figure 7.45.

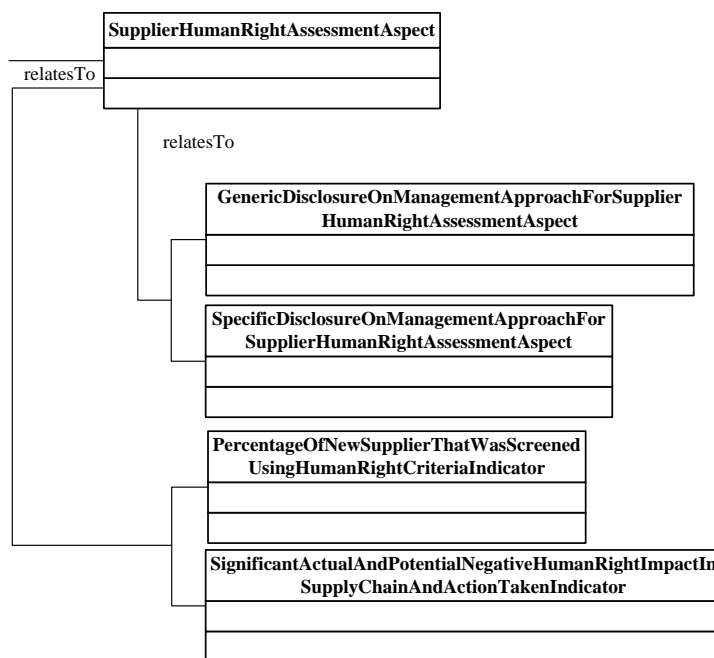


Figure 7.45 Ontology formalization for ‘Supplier Human Right Assessment Aspect’ class

7.2.2.9.1. Ontology for ‘Percentage Of New Supplier That Was Screened Using Human Right Criteria Indicator’ class / HR10

It identifies the new suppliers that contracts with organization and the new suppliers observed using human rights criteria. This indicator class is calculated by dividing the class ‘Total Number Of New Supplier That Was Screened Using Human Right Criteria’ which is the numerator of ‘Total Number Of New Supplier Contracting With Org’ class (Global Reporting Initiative 2013b, 194). The ontology formalization for this indicator is presented in Figure 7.46.

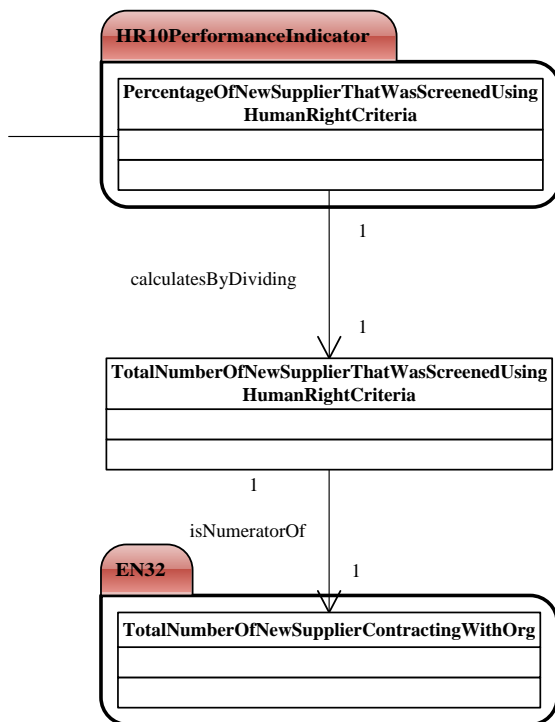


Figure 7.46 Ontology formalization for ‘Percentage Of New Supplier That Was Screened Using Human Right Criteria Indicator’ class

7.2.2.9.2. Ontology for ‘Significant Actual And Potential Negative Human Right Impact In Supply Chain And Action Taken Indicator’ class/ HR11

It identifies and assess significant actual and potential negative human rights impacts on the supply chain and actions taken to address them. The classes that relate to this indicator class are: ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Human Right Impact As Result Of Assessment’, and ‘Action Taken Toward Supplier Identified Having Significant Actual and Potential Negative Human Right Impact’. Firstly, the first percentage related class, is calculated by dividing the class ‘Supplier Subject To Human Right Impact Assessment’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Human Right Impact’. Secondly, the ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Human Right Impact As Result Of Assessment and Action Taken’ class is calculated by dividing the class ‘Action Taken Toward Supplier Identified Having Significant Actual and Potential Negative Human Right Impact’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Human Right Impact’. The ontology for this indicator is shown in Figure 7.47 (Global Reporting Initiative 2013b, 195).

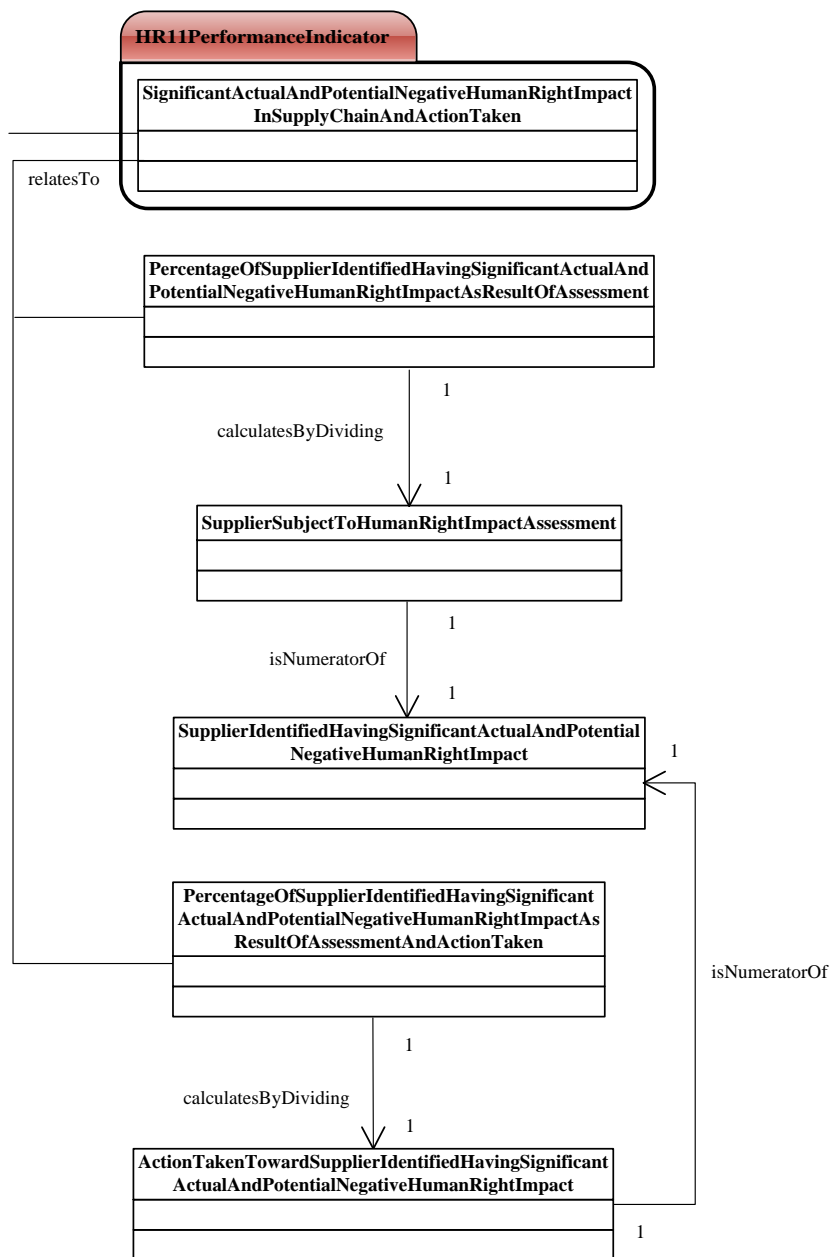


Figure 7.47 Ontology formalization for ‘Significant Actual And Potential Negative Human Right Impact In Supply Chain And Action Taken Indicator’ class

7.2.2.10. Ontology for ‘Human Right Grievance Mechanism Aspect’ class

This is the tenth Aspect that belongs to the ‘Human Right Aspect’ class within ‘Social Category’ class. It emphasizes on “human rights grievances filed” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there is only one indicator that relates to this Aspect HR12 as presented in Figure 7.48.

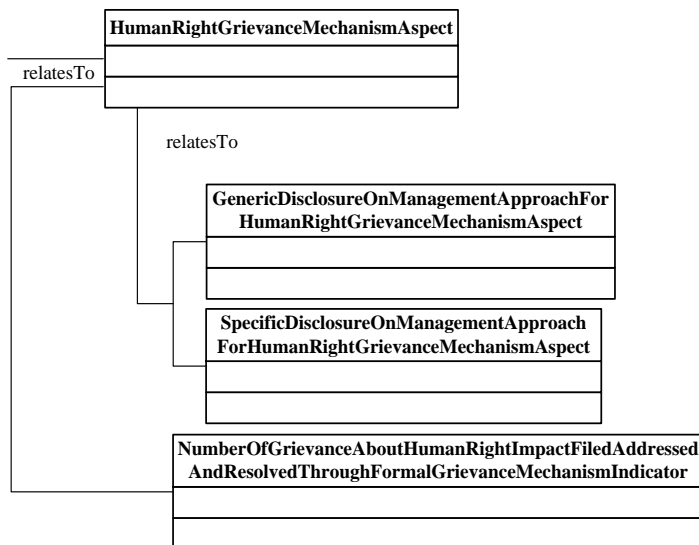


Figure 7.48 Ontology formalization for 'Human Right Grievance Mechanism Aspect' class

7.2.2.10.1. Ontology for 'Number Of Grievances About Human Right Impact Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator' class/ HR12

It identifies existing formal grievance mechanism about human right managed by organization or by an external party. In addition, it is required of the identified grievances to report for the following classes: 'Grievance About Human Right Impact Filed', 'Grievance About Human Right Addressed', and 'Grievance About Human Right Resolved' which occurs in the 'Reporting Period' class (Global Reporting Initiative 2013b, 197). The ontology formalization for this indicator is shown in Figure 7.49.

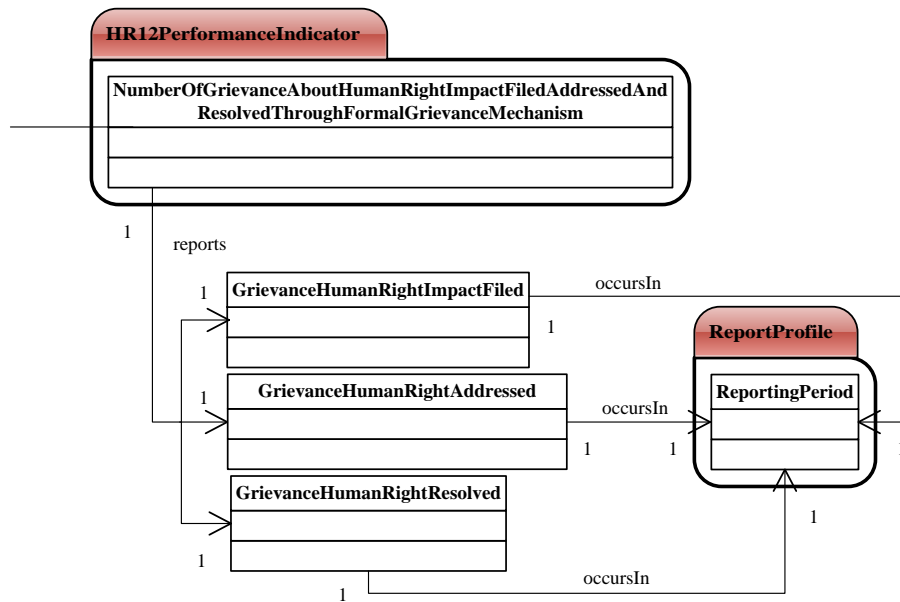


Figure 7.49 Ontology formalization for ‘Number Of Grievances About Human Right Impact Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class

7.2.3. Ontology for ‘Society Aspect’ class

There are seven Aspects as classes in the ‘Society Aspect’ class as indicated in Figure 7.50. They are: ‘Local Community Aspect’, ‘Anti-Corruption Aspect’, ‘Public Policy Aspect’, ‘Anti-Competitive Behavior Aspect’, ‘Compliance On Society Aspect’, ‘Supplier Assessment For Impact On Society Aspect’, and ‘Grievance Mechanism For Impact On Society Aspect’.

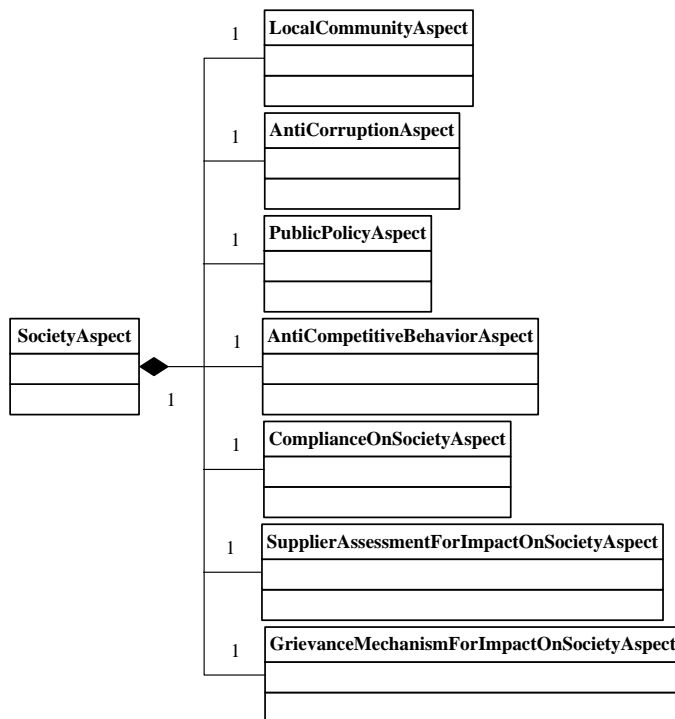


Figure 7.50 Ontology formalization for ‘Society Sub Category’ class

7.2.3.1. Ontology for ‘Local Community Aspect’ class

This is the first Aspect that belongs to the ‘Society Aspect’ class within the ‘Social Category’ class. The essence of this Aspect class is “community engagement, impact assessments, and development programs” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there are two indicators that relate to this Aspect SO1 and SO2 as shown in Figure 7.51.

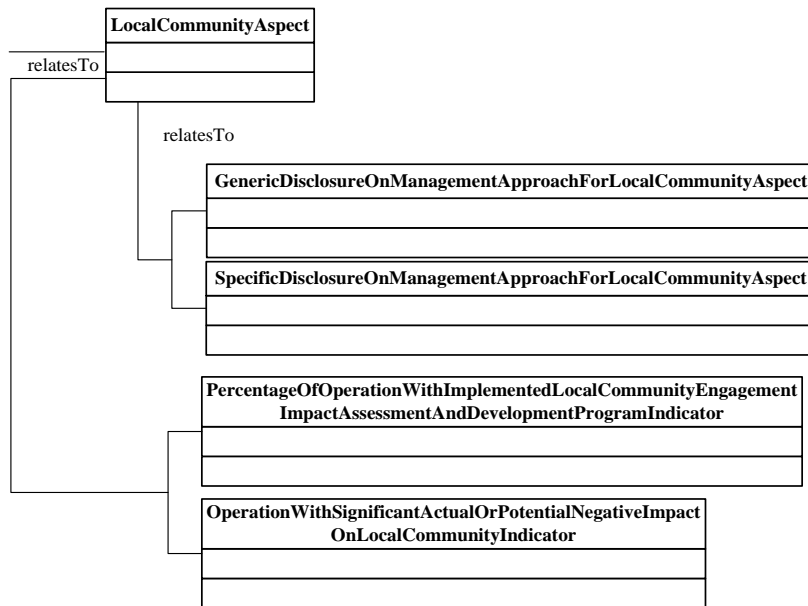


Figure 7.51 Ontology formalization for ‘Local Community Aspect’ class

7.2.3.1.1. Ontology for ‘Percentage Of Operation With Implemented Local Community Engagement Impact Assessment And Development Program Indicator’ class/ SO1

It identifies operation that has undertaken organization-wide local community engagement, impact assessments, and development programs. The class that relates to this indicator class is ‘Organization Wide’. This indicator class is associated with ‘Scale Of Org’ class in terms of total number of operations that should match the operations in the ‘Scale Of Org’ class. It is required to report the total number of operations within the ‘Scale Of Org’ class that has undertaken the ‘Organization Wide’ class to calculate the percentage of operations implemented for the following classes: ‘Operation With Implemented Local Community Engagement’, ‘Operation With Implemented Impact Assessment’, and ‘Operation With Implemented Development Program’ (Global Reporting Initiative 2013b, 200-201). The ontology formalization for this indicator is shown in Figure 7.52. The data property can be found in Table 8.189 to Table 8.192.

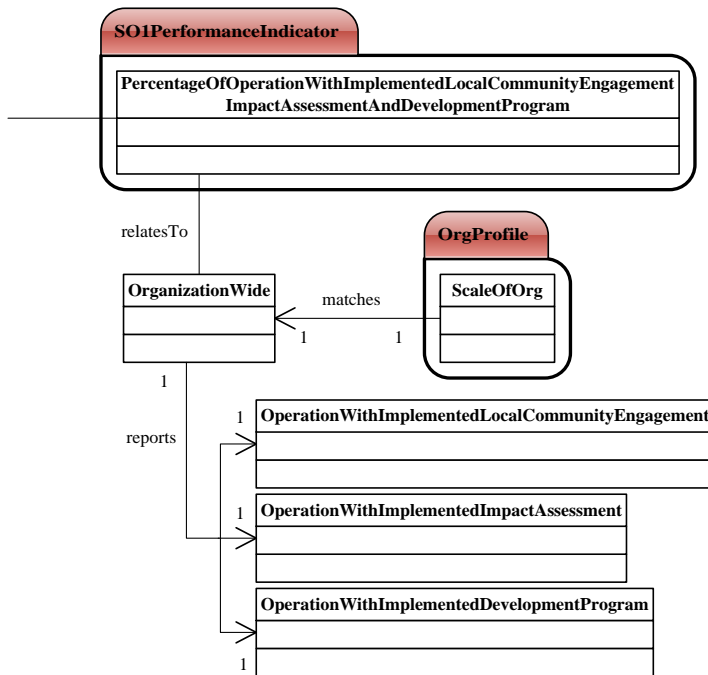


Figure 7.52 Ontology formalization for ‘Percentage Of Operation With Implemented Local Community Engagement Impact Assessment And Development Program Indicator’ class

7.2.3.1.2. Ontology for ‘Operation With Significant Actual And Potential Negative Impact On Local Community Indicator’ class/ SO2

It is required to identify the location of operations in the local community, significant actual and potential negative impact of operations on the local community, and the sources of information about them (Global Reporting Initiative 2013b, 202-203). The ontology formalization for this indicator is presented in Figure 7.53. The data properties can be found in Table 8.193.

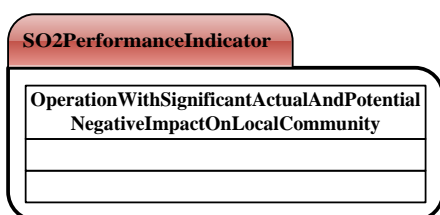


Figure 7.53 Ontology formalization for ‘Operation With Significant Actual And Potential Negative Impact On Local Community Indicator’ class

7.2.3.2. Ontology for ‘Anti-Corruption Aspect’ class

This is the second Aspect that belongs to the ‘Society Aspect’ class within ‘Social Category’ class. The core of this Aspect class is “operations assessed for risks of corruption” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there are three indicators that relate to this Aspect SO3 to SO5 as indicated in Figure 7.54.

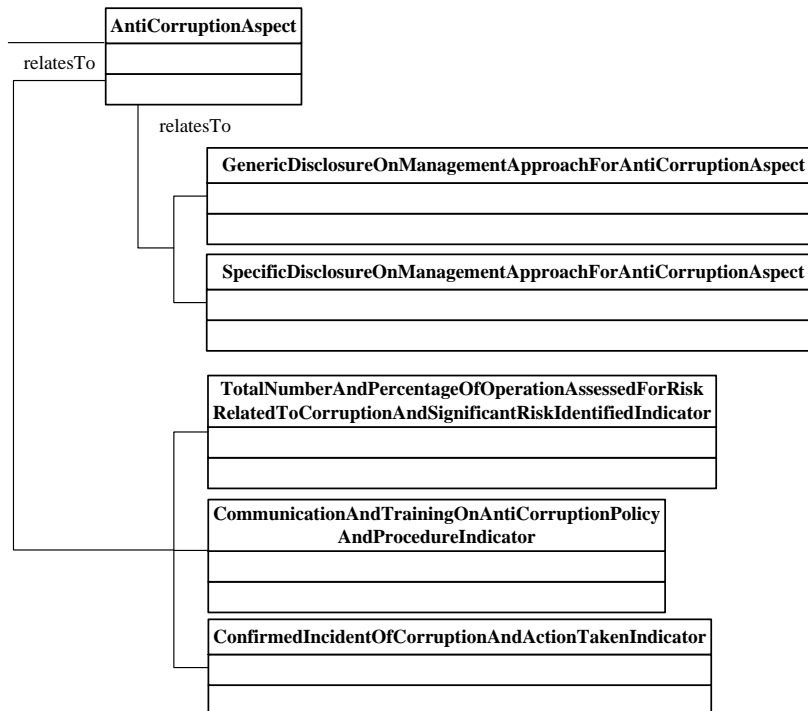


Figure 7.54 Ontology formalization for ‘Anti-Corruption Aspect’ class

7.2.3.2.1. Ontology for ‘Total Number And Percentage Of Operation Assessed For Risk Related To Corruption And Significant Risk Identified Indicator’ class/ SO3

It refers to operation assessed for risks related to corruption and significant risks related to corruption identified through risk assessment. The classes that relate to this indicator class are: ‘Operation Assessed For Risk Related To Corruption’, and ‘Significant Risk Related To Corruption Identified Through Risk Assessment’. It is required to report the total number and percentage of operations assessed for corruption risk and any other significant related risk (Global Reporting Initiative 2013b, 206). The ontology formalization for this indicator is shown in Figure 7.55.

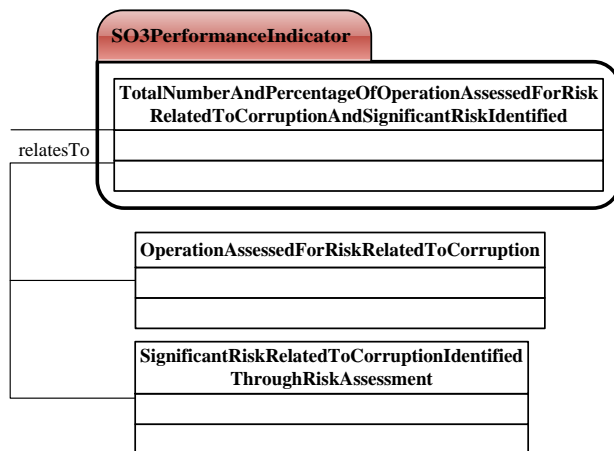


Figure 7.55 Ontology formalization for ‘Total Number And Percentage Of Operation Assessed For Risk Related To Corruption And Significant Risk Identified Indicator’ class

7.2.3.2.2. Ontology for ‘Communication and Training On Anti-Corruption Policy and Procedure Indicator’ class/ SO4

It relates to governance body members, employees and business partners realizing the organization’s anti-corruption policies and procedures. The classes that relate to this indicator class are: ‘Governance Body Communicated To Org Anti-Corruption Policy and Procedure’, ‘Employee Communicated To Org Anti-Corruption Policy and Procedure’, ‘Business Partner Communicated To Org Anti-Corruption Policy and Procedure’, ‘Governance Body Received Training On Org Anti-Corruption’, and ‘Employee Received Training On Org Anti-Corruption’. It is required to report the total number and percentage of the above classes by region, employee category and type of business partner. So, the first related class is part of the class under LA12 ‘Individual Within Governance Body’ and it excludes the ‘Employee Category’ class, and the second related class is part of the class under LA12 ‘Employee Category’ (Global Reporting Initiative 2013b, 207). The ontology formalization for this indicator is shown in Figure 7.56.

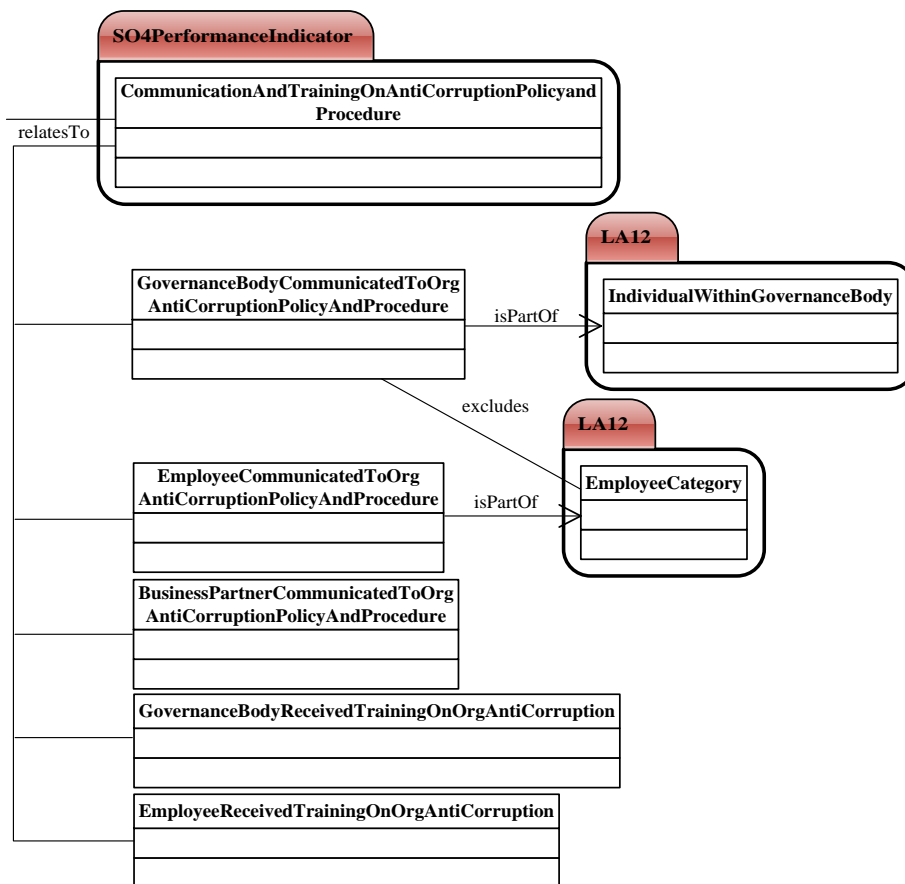


Figure 7.56 Ontology formalization for ‘Communication And Training On Anti-Corruption Policy And Procedure Indicator’ class

7.2.3.2.3. Ontology for ‘Confirmed Incident Of Corruption And Action Taken Indicator’ class/ SO5

It refers to incidents of corruption that confirmed and public legal cases taken. There are two classes related to this indicator class: ‘Confirmed Incident Of Corruption’, and ‘Action Taken Regarding Corruption’ occur in the ‘Reporting Period’ class. It is required to identify the total number and the nature of the confirmed incidents of corruption (Global Reporting Initiative 2013b, 208). The ontology formalization for this indicator is given in Figure 7.57.

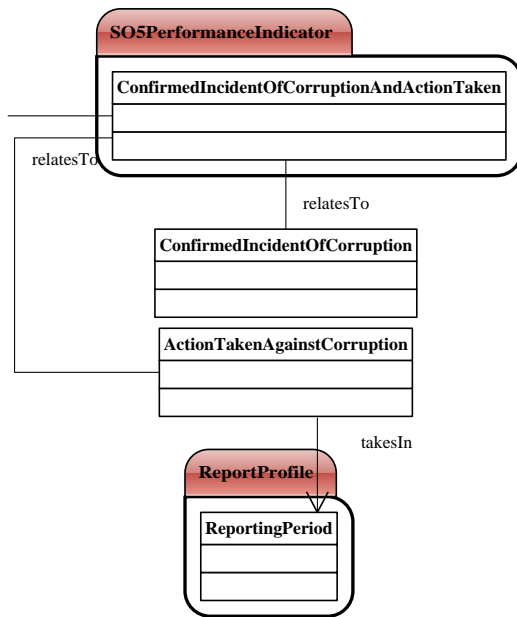


Figure 7.57 Ontology formalization for ‘Confirmed Incident Of Corruption And Action Taken Indicator’ class

7.2.3.3. Ontology for ‘Public Policy Aspect’ class

This is the third Aspect that belongs to the ‘Society Aspect’ class within ‘Social Category’ class. The core of this Aspect class is “value of political contributions” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there is only one indicator that relates to this Aspect SO6 as indicated in Figure 7.58.

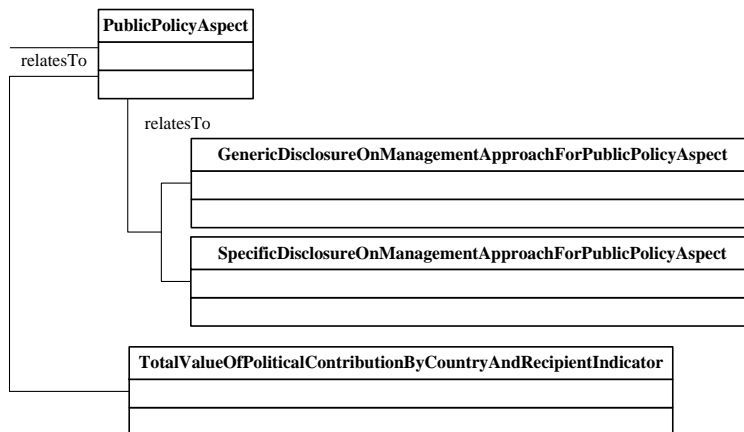


Figure 7.58 Ontology formalization for ‘Public Policy Aspect’ class

7.2.3.3.1. Ontology for ‘Total Value Of Political Contribution By Country And Recipient Indicator’ class/ SO6

It is required to report the amount in monetary or financial terms and in-kind political contributions which have been made directly or indirectly to the ‘Organization’ class by country and recipient (Global Reporting Initiative 2013b, 210). The ontology formalization for this indicator is indicated in Figure 7.59. The data properties can be found in Table 8.194.

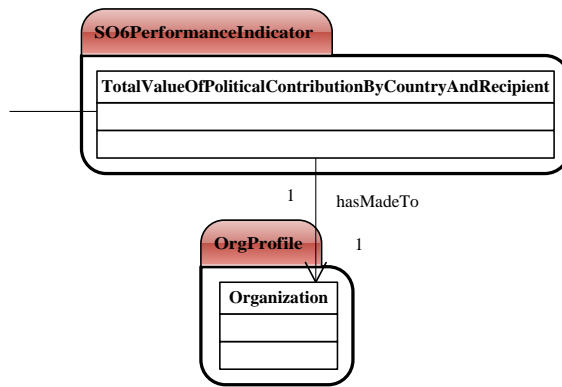


Figure 7.59 Ontology formalization for ‘Total Value Of Political Contribution By Country And Recipient Indicator’ class

7.2.3.4. Ontology for ‘Anti-Competitive Behavior Aspect’ class

This is the fourth Aspect that belongs to ‘Society Aspect’ class within ‘Social Category’ class. This Aspect class concerns the “legal actions for anticompetitive, antitrust, and monopoly practices” (English and K.Schooley 2014). There is a generic DMA and there is only one indicator that relates to this Aspect SO7 as presented in Figure 7.60.

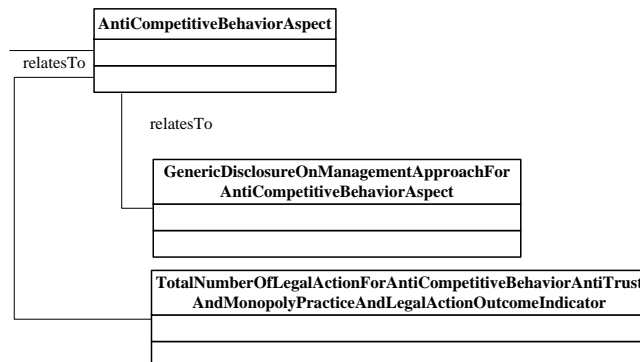


Figure 7.60 Ontology formalization for ‘Anti-Competitive Behavior Aspect’ class

7.2.3.4.1. Ontology for ‘Total Number Of Legal Action For Anti-Competitive Behavior Anti-Trust And Monopoly Practice And Legal Action Outcome Indicator’ class/ SO7

It is required to report the total number of legal actions in regard to anti-competitive behavior, anti-trust, and monopoly legislation in which the ‘Organization’ class participates in the ‘Reporting Period’ class and their outcomes (Global Reporting Initiative 2013b, 212). The ontology formalization for this indicator is shown in Figure 7.61.

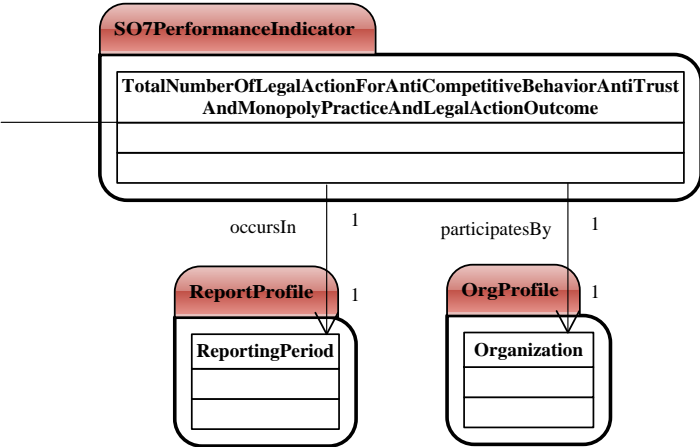


Figure 7.61 Ontology formalization for ‘Total Number Of Legal Action For Anti-Competitive Behavior Anti-Trust And Monopoly Practice And Legal Action Outcome Indicator’ class

7.2.3.5. Ontology for ‘Compliance On Society Aspect’ class

This is the fifth Aspect that belongs to ‘Society Aspect’ class within ‘Social Category’ class. This Aspect class refers to “sanctions for noncompliance with laws and regulations” (English and K.Schooley 2014). There is a generic DMA and only one indicator that relates to this Aspect SO8 as presented in Figure 7.62.

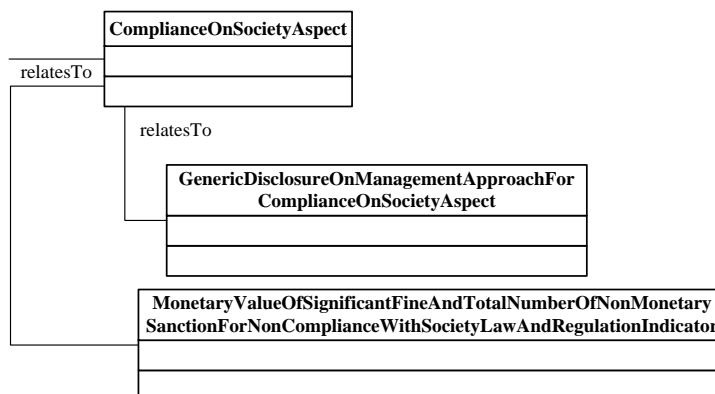


Figure 7.62 Ontology formalization for ‘Compliance On Society Aspect’ class

7.2.3.5.1. Ontology for ‘Monetary Value Of Significant Fine And Total Number Of Non-Monetary Sanction For Non Compliance On Society With Law And Regulation Indicator’ class/ SO8

It refers to administrative or judicial sanction levied against the organization for breakingdown society law and regulation. The class that relates to this indicator class is ‘Administrative Or Judicial Sanction For Non Compliance With Society Law and Regulation’ which is levied against the ‘Organization’ class. It includes these two classes: ‘International Declaration Convention Treaty and National Sub-National Regional and Local Regulation’, and ‘Case Brought Against Org Through Using International Dispute Mechanism Or National Dispute Mechanism Supervised By Government Authority’ (Global Reporting Initiative 2013b, 214). The ontology formalization for this indicator is given in Figure 7.63. The data properties can be found in Table 8.195.

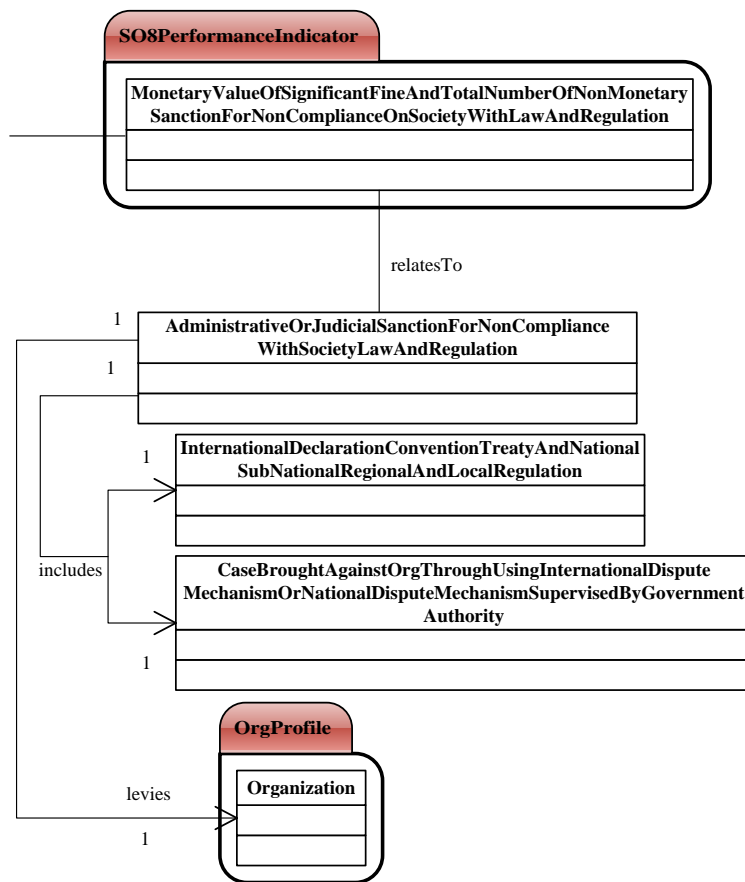


Figure 7.63 Ontology formalization for ‘Monetary Value Of Significant Fine And Total Number Of Non-Monetary Sanction For Non Compliance On Society With Law And Regulation Indicator’ class

7.2.3.6. Ontology for ‘Supplier Assessment For Impact On Society Aspect’ class

This is the sixth Aspect that belongs to the ‘Society Aspect’ class within the ‘Social Category’ class. This Aspect class points out “suppliers screened using criteria for impacts on society”. There are generic and specific DMA. In addition, there are two indicators that relate to this Aspect, SO9 and SO10 as indicated in Figure 7.64.

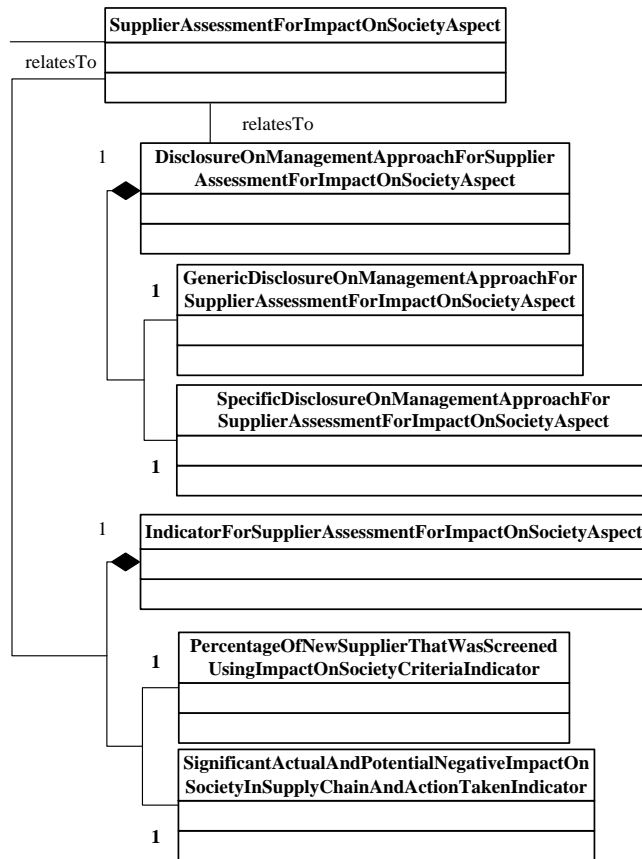


Figure 7.64 Ontology formalization for ‘Supplier Assessment For Impact On Society Aspect’ class

7.2.3.6.1. Ontology for ‘Percentage Of New Supplier That Was Screened Using Criteria For Impact On Society Indicator’ class/ SO9

It refers to the new suppliers contact with the organization and new suppliers that observed using criteria for impacts on society. This indicator class is calculated by dividing ‘Total Number Of New Supplier That Was Screened Using Impact On Society Criteria’ class which is the numerator of ‘Total Number Of New Supplier Contracting With Org’ class. The ontology formalization for this indicator is presented in Figure 7.65.

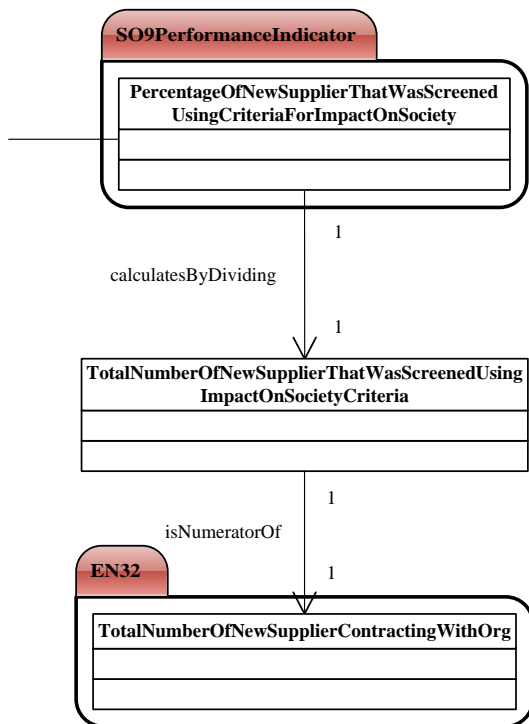


Figure 7.65 Ontology formalization for ‘Percentage Of New Supplier That Was Screened Using Criteria For Impact On Society Indicator’ class

7.2.3.6.2. Ontology for ‘Significant Actual And Potential Negative Impact On Society In Supply Chain and Action Taken Indicator’ class/ SO10

It is required to identify and assess significant actual and potential negative impacts on society in the supply chain and actions taken to address them. The classes that relate to this indicator class are: ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Impact On Society As Result Of Assessment’, and ‘Percentage Of Supplier Identified Having Significant Actual and Potential Negative Impact On Society As Result Of Assessment and Action Taken’. Firstly, the percentage of the first related class is calculated by dividing the class ‘Supplier Subject To Assessment For Impact On Society’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Impact On Society’. Secondly, the percentage for the second related class calculated by dividing the class ‘Action Taken Toward Supplier Identified Having Significant Actual and Potential Negative Impact On Society’ which is a numerator of the class ‘Supplier Identified Having Significant Actual and Potential Negative Impact On Society’ (Global Reporting Initiative 2013b, 218). The ontology for this indicator is given in Figure 7.66.

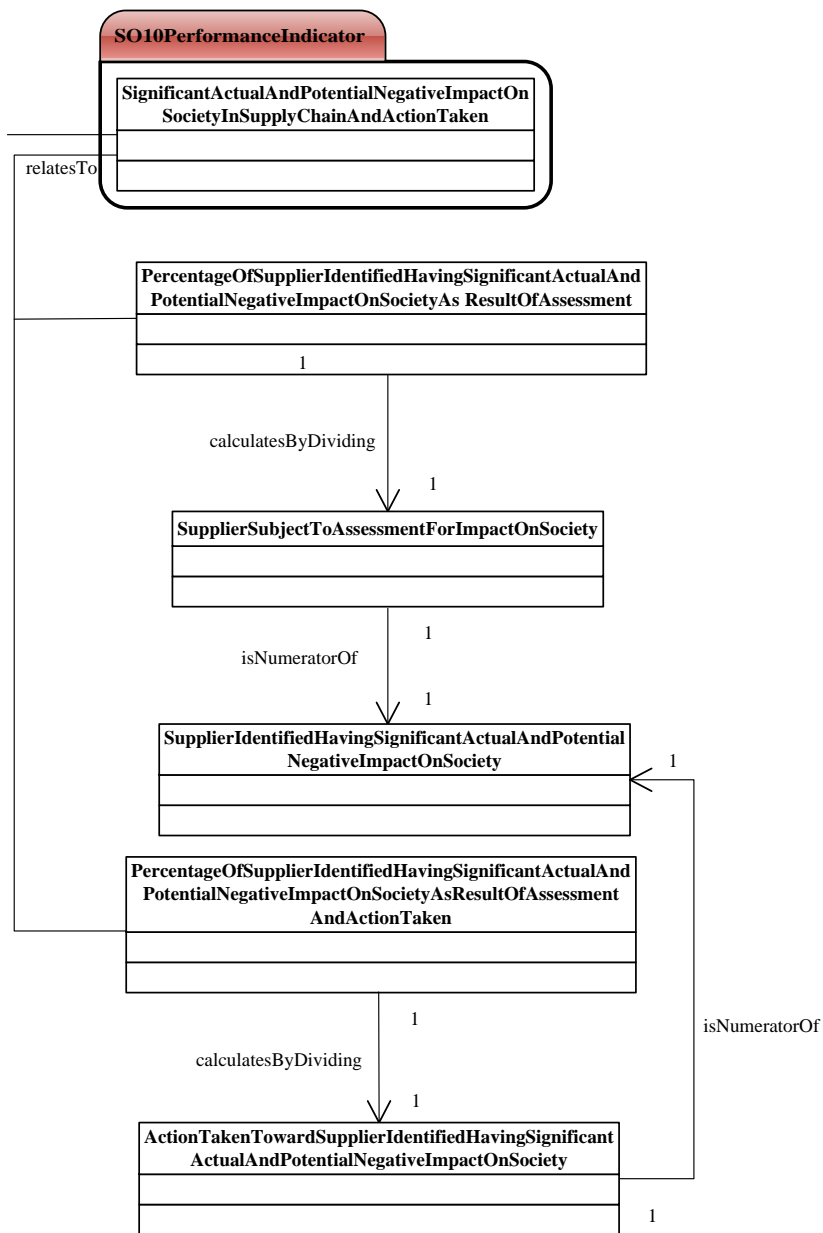


Figure 7.66 Ontology formalization for ‘Significant Actual And Potential Negative Impact On Society In Supply Chain And Action Taken Indicator’ class

7.2.3.7. Ontology for ‘Grievance Mechanism For Impact On Society Aspect’ class

This is the seventh and final Aspect that belongs to ‘Society Aspect’ class within ‘Social Category’ class. This Aspect class focuses on “grievances about impacts on society” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there is only one indicator that relates to this Aspect SO11 as indicated in Figure 7.67.

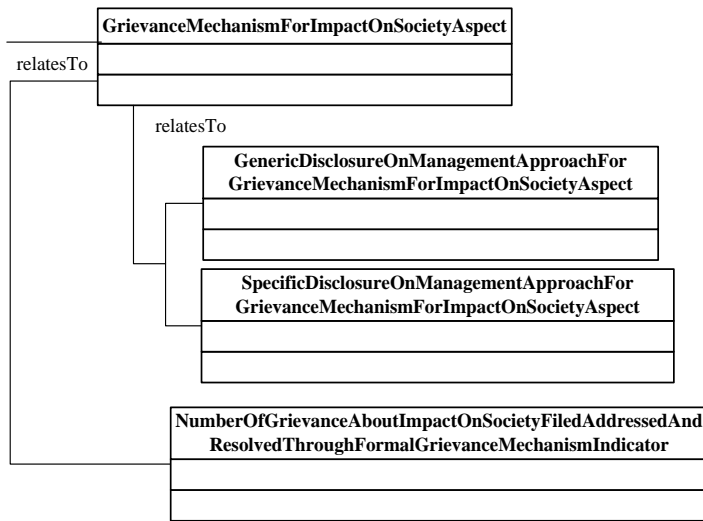


Figure 7.67 Ontology formalization for ‘Grievance Mechanism For Impact On Society Aspect’ class

7.2.3.7.1. Ontology for ‘Number Of Grievance About Impact On Society Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class/ SO11

It is required to identify existing formal grievance mechanism about impact on society managed by organization or by an external party. In addition, it is required that the identified grievances be reported for the following classes: ‘Grievance About Impact On Society Filed’, ‘Grievance About Impact On Society Addressed’, and ‘Grievance About Impact On Society Resolved’ which is occurred in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 220). The ontology formalization for this indicator is shown in Figure 7.68. The data properties can be found in Table 8.196 to Table 8.198.

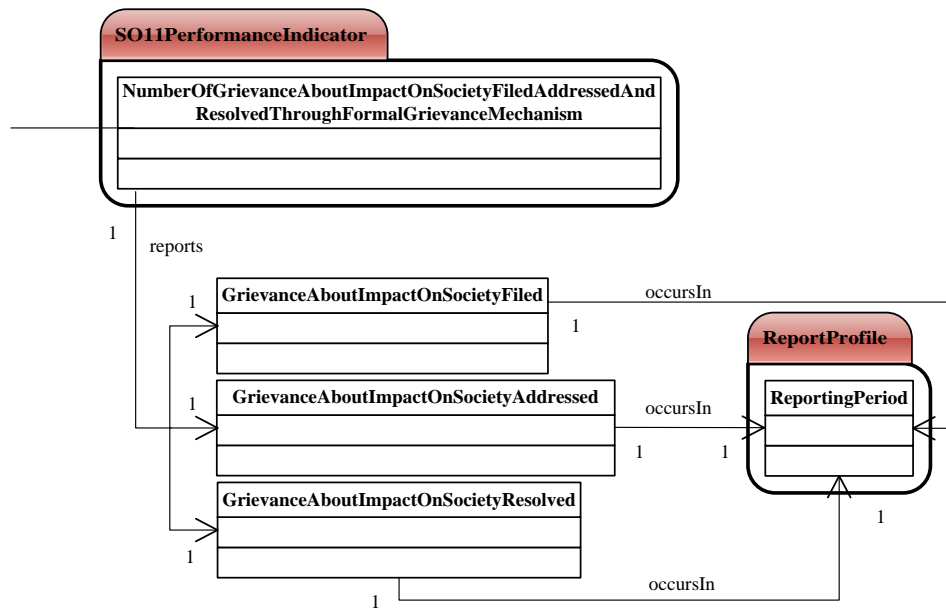


Figure 7.68 Ontology formalization for ‘Number Of Grievance About Impact On Society Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class

7.2.4. Ontology for ‘Product Responsibility Aspect’ class

There are five classes as Aspects in the ‘Product Responsibility Aspect’ class as presented in Figure 7.69. They are: ‘Customer Health and Safety Aspect’, ‘Product and Service Labeling Aspect’, ‘Marketing Communication Aspect’, ‘Customer Privacy Aspect’, and ‘Compliance On Product Responsibility Aspect’.

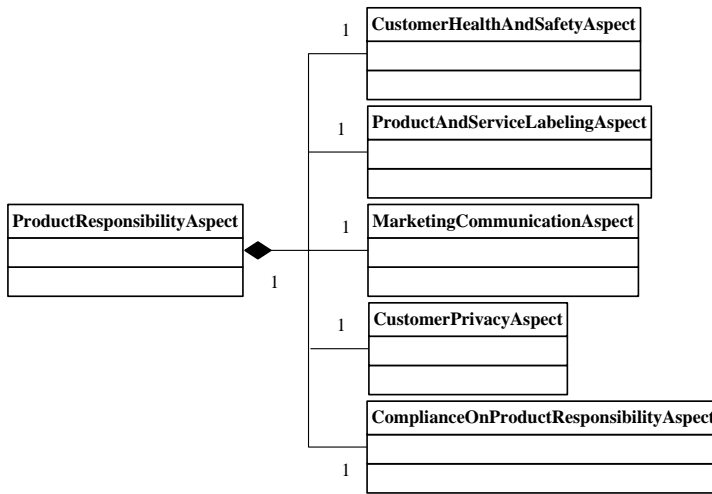


Figure 7.69 Ontology formalization for ‘Product Responsibility Aspect’ class

7.2.4.1. Ontology for ‘Customer Health And Safety Aspect’ class

This is the first Aspect that belongs to the ‘Product Responsibility Aspect’ class within the ‘Social Category’ class. This Aspect emphasizes “Assessment of health and safety impact” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there are two indicators that relate to this Aspect PR1 and PR2 as shown in Figure 7.70.

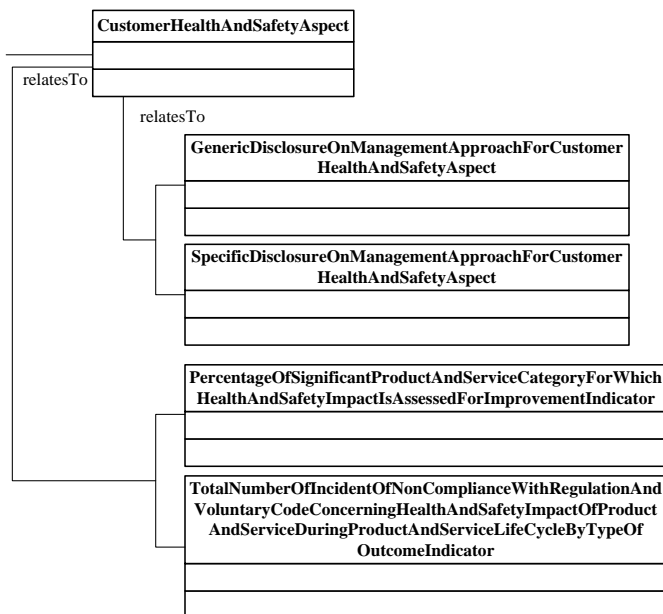


Figure 7.70 Ontology formalization for ‘Customer Health And Safety Aspect’ class

7.2.4.1.1. Ontology for ‘Percentage Of Significant Product And Service Category For Which Health And Safety Impact Is Assessed For Improvement Indicator’ class/ PR1

It relates to significant product and service categories to assess health and safety impacts. The class that relates to this indicator class is ‘Significant Product and Service Category For Which Health and Safety Impact Is Assessed For Improvement’. It is required to report the percentage (Global Reporting Initiative 2013b, 223). The ontology formalization for this indicator is indicated in Figure 7.71.

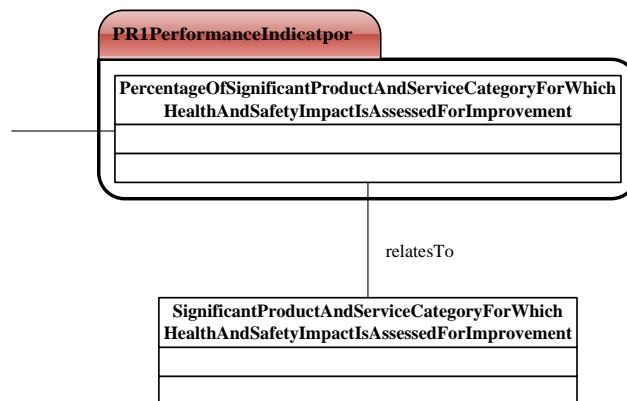


Figure 7.71 Ontology formalization for ‘Percentage Of Significant Product And Service Category For Which Health And Safety Impact Is Assessed For Improvement Indicator’ class

7.2.4.1.2. Ontology for ‘Total Number Of Incident Of Non Compliance With Regulation And Voluntary Code Concerning Health And Safety Impact Of Product and Service During Product And Service Life Cycle By Type Of Outcome Indicator’ class/ PR2

It identifies incidents that breakdown regulatios in regard to health and safety impacts of products and services. The classes that relate to this indicator class are ‘Incident Of Non-Compliance With Regulation With Regulation Concerning Health and Safety Impact Of Product and Service Resulting In Fine Or Penalty’, ‘Incident Of Non-Compliance With Regulation Concerning Health and Safety Impact Of Product and Service Resulting In Warning’, and ‘Incident Of Non-Compliance With Voluntary Code Concerning Health and Safety Impact Of Product and Service’, in terms of total number of each class which occurs in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 224). The ontology formalization for this indicator is indicated in Figure 7.72. The data property can be found in Table 8.199.

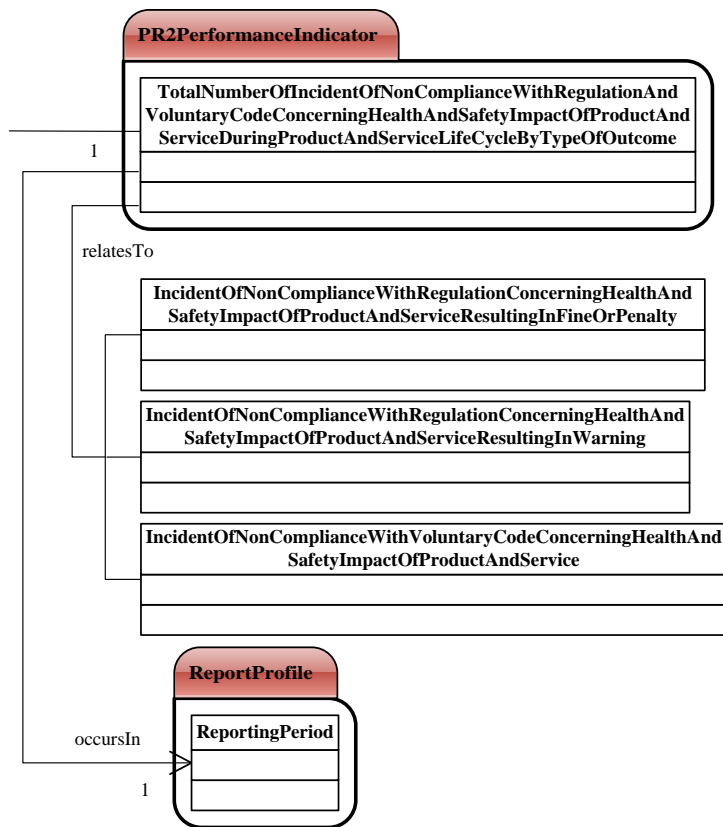


Figure 7.72 Ontology formalization for ‘Total Number Of Incident Of Non Compliance With Regulation And Voluntary Code Concerning Health And Safety Impact Of Product And Service During Product And Service Life Cycle By Type Of Outcome Indicator’ class

7.2.4.2. Ontology for ‘Product And Service Labeling Aspect’ class

This is the second Aspect that belongs to ‘Product Responsibility Aspect’ class within the ‘Social Category’ class. This Aspect highlights the “product and service information labeling requirements” (English and K.Schooley 2014). There are generic and specific DMAs. In addition, there are three indicators that relate to this Aspect PR3 to PR5 as shown in Figure 7.73.

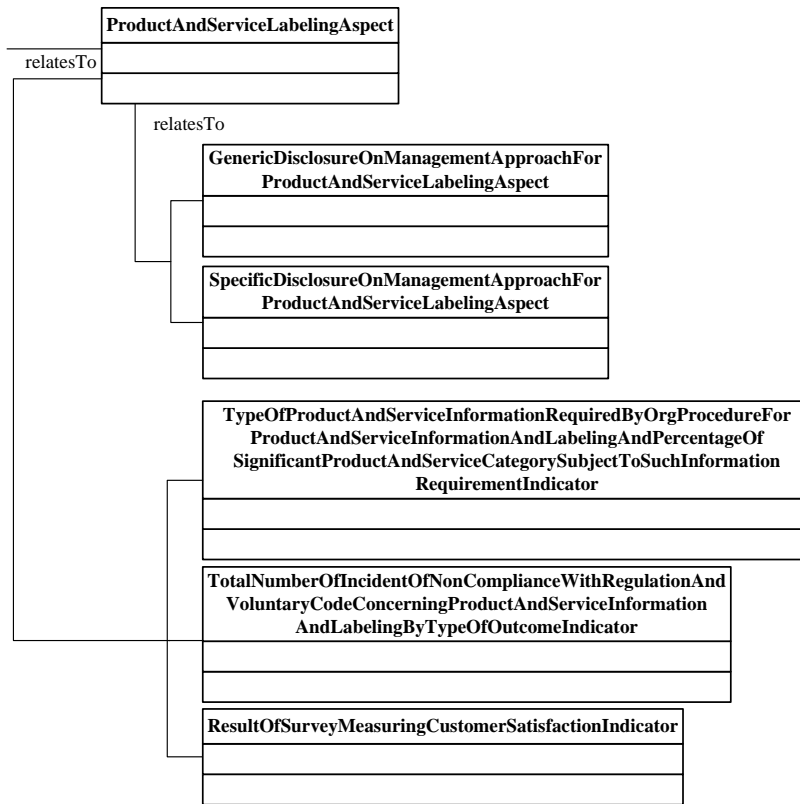


Figure 7.73 Ontology formalization for 'Product And Service Labeling Aspect' class

7.2.4.2.1. Ontology for 'Type Of Product and Service Information Required By Org Procedure For Product and Service Information And Labeling And Percentage Of Significant Product and Service Category Subject To Product And Service Information Requirement Indicator' class/ PR3

It identifies significant product or service categories and some information is required by organization's procedures for product service information and labeling. The class that relates to this indicator class is 'Product and Service Information and Label' which is required by the 'Organization' class in terms of total number and type of product and service information required for product and service information and labeling (Global Reporting Initiative 2013b, 226). The ontology formalization for this indicator is indicated in Figure 7.74.

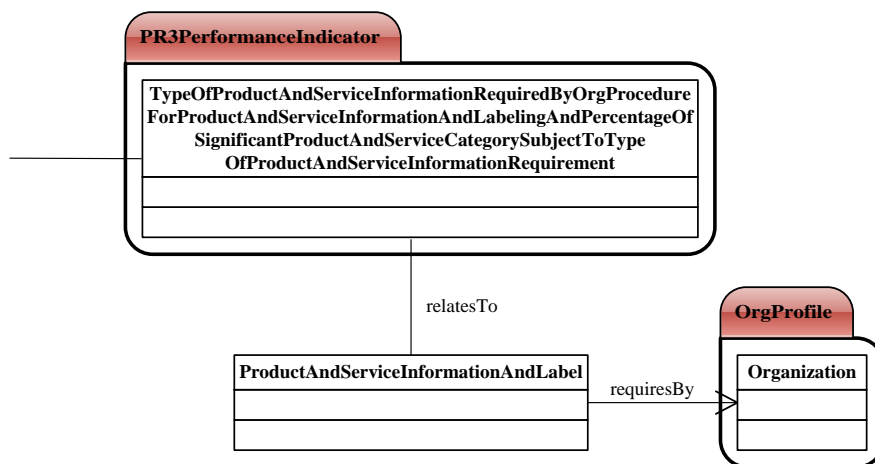


Figure 7.74 Ontology formalization for ‘Type Of Product And Service Information Required By Org Procedure For Product And Service Information And Labeling And Percentage Of Significant Product And Service Category Subject To Product And Service Information

7.2.4.2.2. Ontology for ‘Total Number Of Incident Of Non Compliance With Regulation And Voluntary Code Concerning Product And Service Information And Labeling By Type Of Outcome Indicator’ class/ PR4

It identifies incidents for breakingdown regulations in regard to product and service information and labeling. The classes that relate to this indicator class are: ‘Incident Of Non Compliance With Regulation Concerning Product and Service Labeling Resulting In Fine Or Penalty’, ‘Incident Of Non Compliance With Regulation Concerning Product and Service Labeling Resulting In Warning’, and ‘Incident Of Non Compliance With Voluntary Code Concerning Product and Service Labeling’ in terms of total number, which is occurred in the ‘Reporting Period’ class (Global Reporting Initiative 2013b, 227). The ontology formalization for this indicator is indicated in Figure 7.75.

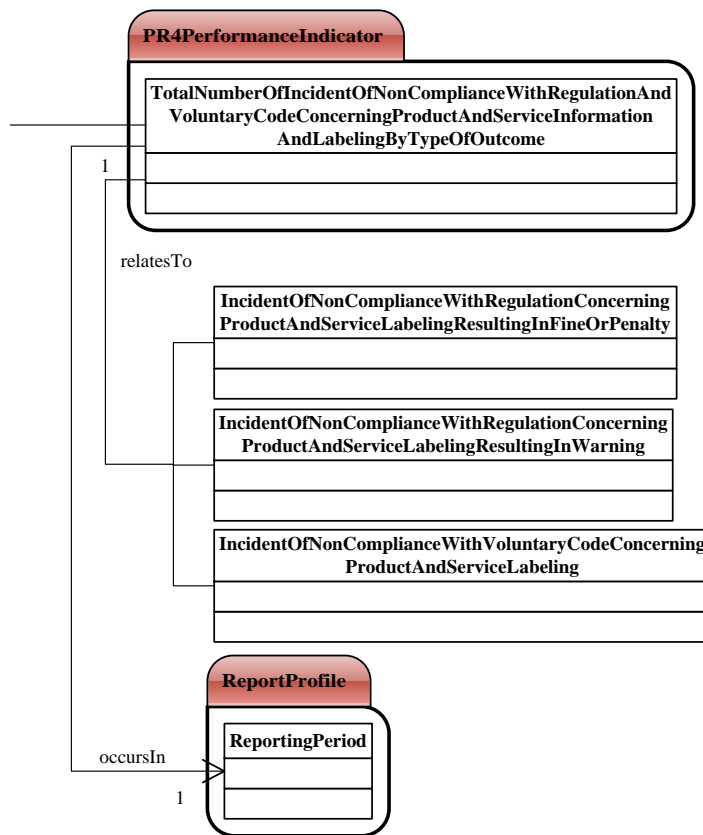


Figure 7.75 Ontology formalization for ‘Total Number Of Incident Of Non Compliance With Regulation And Voluntary Code Concerning Product And Service Information And Labeling By Type Of Outcome Indicator’ class

7.2.4.2.3. Ontology for ‘Result Of Survey Measuring Customer Satisfaction Indicator’ class/ PR5

It refers to survey results of customer satisfaction for the product or service category or locations of operation to which this survey is applied. The class that relates to this indicator class is ‘Result Or Key Of Survey’ which is conducted in the ‘Reporting Period’ class. The first related class measures the ‘Customer Satisfaction’ class. In addition, it is the super-class of the following sub-classes: ‘Result Or Key Of Survey For Whole Org’, ‘Result Or Key Of Survey For Major Product Or Service Category’, and ‘Result Or Key Of Survey For Location Of Operation’ (Global Reporting Initiative 2013b, 228). The ontology formalization for this indicator is presented in Figure 7.76. The data properties can be found in Table 8.200 and Table 8.201.

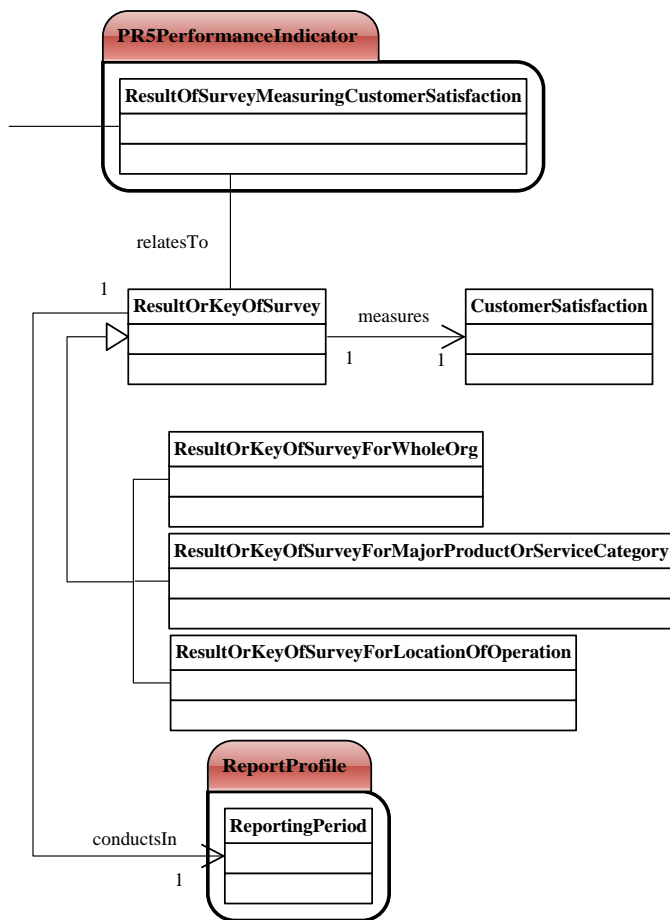


Figure 7.76 Ontology formalization for ‘Result Of Survey Measuring Customer Satisfaction Indicator’ class

7.2.4.3. Ontology for ‘Marketing Communication Aspect’ class

This is the third Aspect that belongs to ‘Product Responsibility Aspect’ class within the ‘Social Category’ class. The essence of this Aspect is “sale of banned or disputed products” (English and K.Schooley 2014). There is generic DMA and there are two indicators that relate to this Aspect PR6 and PR7 as indicated in Figure 7.77.

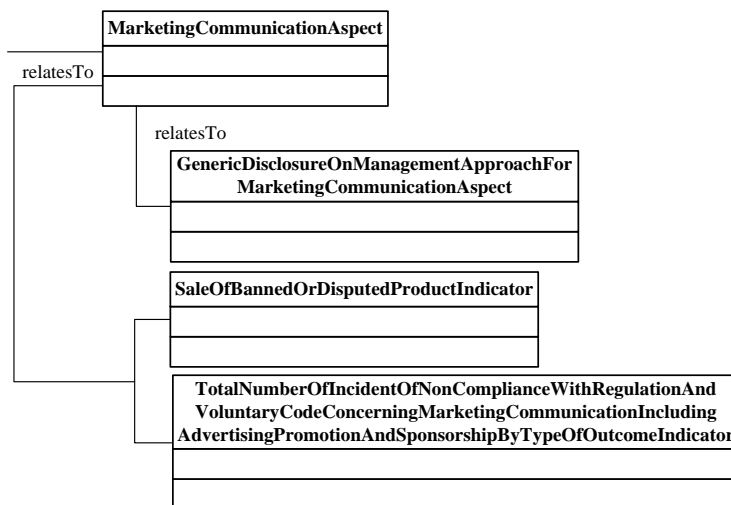


Figure 7.77 Ontology formalization for ‘Marketing Communication Aspect’ class

7.2.4.3.1. Ontology for ‘Sale Of Banned Or Disputed Product Indicator’ class/ PR6

It refers to whether the organization deals with sale of banned or disputed products and the mechanisms taken. There are two classes that relate to this indicator class: ‘Product Portfolio’, and ‘Mechanism To Track Engagement With Stakeholder’. It is required to report whether ‘Organization’ class has a ‘Product Portfolio’ that deals with banned products and its stakeholders’ concerns. In addition, what mechanisms are used by ‘Organization’ as a response to these questionable products? (Global Reporting Initiative 2013b, 230). The ontology formalization for this indicator is shown in Figure 7.78.

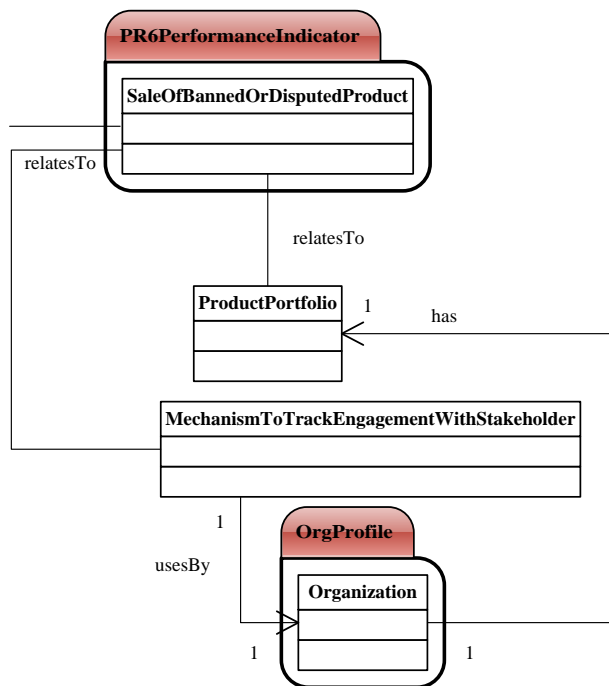


Figure 7.78 Ontology formalization for ‘Sale Of Banned Or Disputed Product Indicator’ class

7.2.4.3.2. Ontology for ‘Total Number Of Incident Of Non Compliance With Regulation And Voluntary Code Concerning Marketing Communication Including Advertising Promotion And Sponsorship By Type Of Outcome Indicator’ class/ PR7

It refers to incidents for breakingdown regulations in regard to marketing communications, advertising, promotion and sponsorship. The classes that relate to this indicator class are: ‘Incident Of Non Compliance With Regulation Concerning Marketing Communication Resulting In Fine Or Penalty’, ‘Incident Of Non Compliance With Regulation Concerning Marketing Communication Resulting In Warning’, and ‘Incident Of Non Compliance With Voluntary Code Concerning Marketing Communication’ which occur in the ‘Reporting Period’ class in terms of total number (Global Reporting Initiative 2013b, 231). The ontology formalization for this indicator is shown in Figure 7.79. The data properties can be found in Table 8.202.

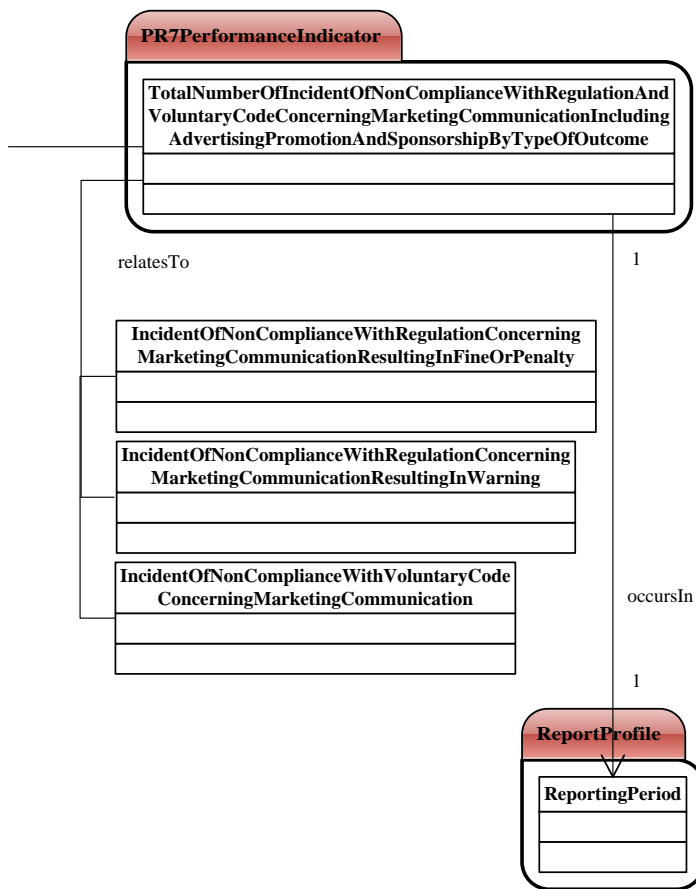


Figure 7.79 Ontology formalization for ‘Total Number Of Incident Of Non Compliance With Regulation And Voluntary Code Concerning Marketing Communication Including Advertising Promotion And Sponsorship By Type Of Outcome Indicator’ class

7.2.4.4. Ontology for ‘Customer Privacy Aspect’ class

This is the fourth Aspect that belongs to the ‘Product Responsibility Aspect’ class within the ‘Social Category’ class. The core of this Aspect is “breaches of customer privacy and losses of customer data”(English and K.Schooley 2014). There is generic DMA and there is only one indicator that relates to this Aspect PR8 as indicated in Figure 7.80.

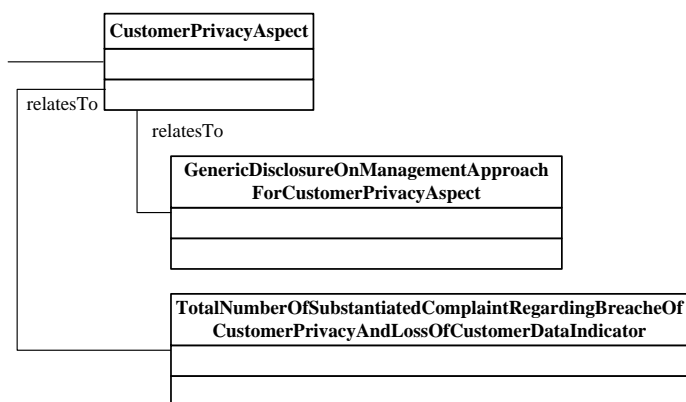


Figure 7.80 Ontology formalization for 'Customer Privacy Aspect' class

7.2.4.4.1. Ontology for 'Total Number Of Substantiated Complaint Regarding Breach Of Customer Privacy And Loss Of Customer Data Indicator' class/ PR8

It relates to complaints in regard to breaches of customer privacy. There are two classes that relate to this indicator class: 'Complaint Regarding Breach Of Customer Privacy', and 'Customer Data'. The first related class which occurs in the 'Reporting Period' as a super-class has two sub-classes: 'Complaint Received From Outside Party' which is substantiated by the 'Organization' class, and 'Complaint Received From Regulatory Body' in which the sub-classes inherit the datatype property of the super class in terms of total number. The second related class is 'Customer Data' which is a super-class for the following sub-classes: 'Leak Of Customer Data', 'Theft Of Customer Data', and 'Loss Of Customer Data' which inherit the datatype properties of the super class in terms of total number (Global Reporting Initiative 2013b, 233; English and K.Schooley 2014). The ontology formalization for this indicator is shown in Figure 7.81. The data properties can be found in Table 8.203 to Table 8.205.

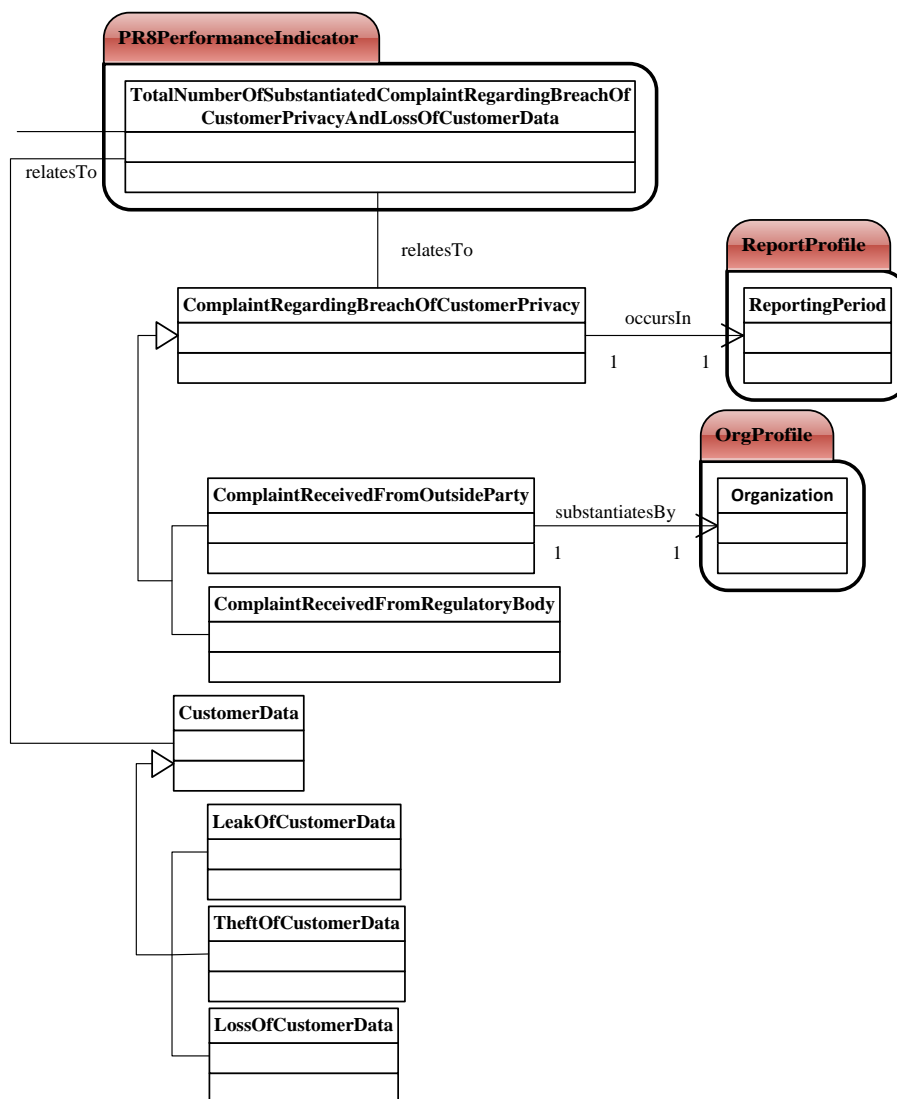


Figure 7.81 Ontology formalization for ‘Total Number Of Substantiated Complaint Regarding Breach Of Customer Privacy And Loss Of Customer Data Indicator’ class

7.2.4.5. Ontology for ‘Compliance On Product Responsibility Aspect’ class

This is the fifth Aspect that belongs to ‘Product Responsibility Aspect’ class within the ‘Social Category’ class. The center of this Aspect is “non-compliance in the provision and use of products and services” (English and K.Schooley 2014). There is generic DMA. In addition, there is only one indicator that relates to this Aspect PR9 as indicated in Figure 7.82.

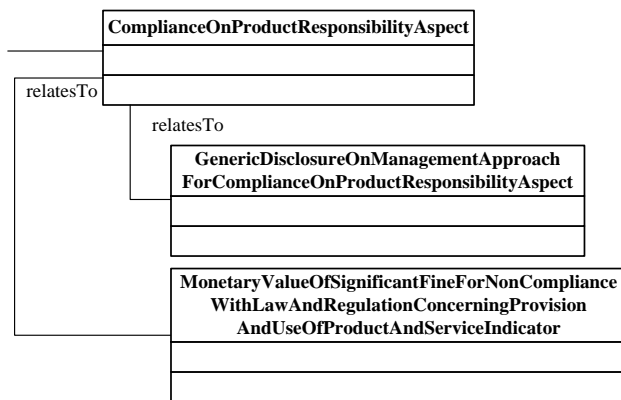


Figure 7.82 Ontology formalization for ‘Compliance On Product Responsibility Aspect’ class

7.2.4.5.1. Ontology for ‘Monetary Value Of Significant Fine For Non-Compliance With Law And regulation Concerning Provision And Use Of Product And Service Indicator’ class/ PR9

It relevants to administrative or judicial levied against organization concerning using its products and services. The class that relates to this indicator class is ‘Administrative Or Judicial Sanction For Non Compliance With Law and Regulation Concerning Provision and Use Of Product and Service’ which is levied from the ‘Organization’ class. This class includes the following classes which are: ‘Incident Of Non Compliance With Regulation Concerning Health and Safety Impact Of Product and Service Resulting In Fine Or Penalty’ under PR2, ‘Incident Of Non Compliance With Regulation Concerning Product and Service Labeling Resulting In Fine Or Penalty’ under PR4, and ‘Incident Of Non Compliance With Regulation Concerning Marketing Communication Resulting In Fine Or Penalty’ under PR7 (Global Reporting Initiative 2013b, 235). The ontology formalization for this indicator is indicated in Figure 7.83.

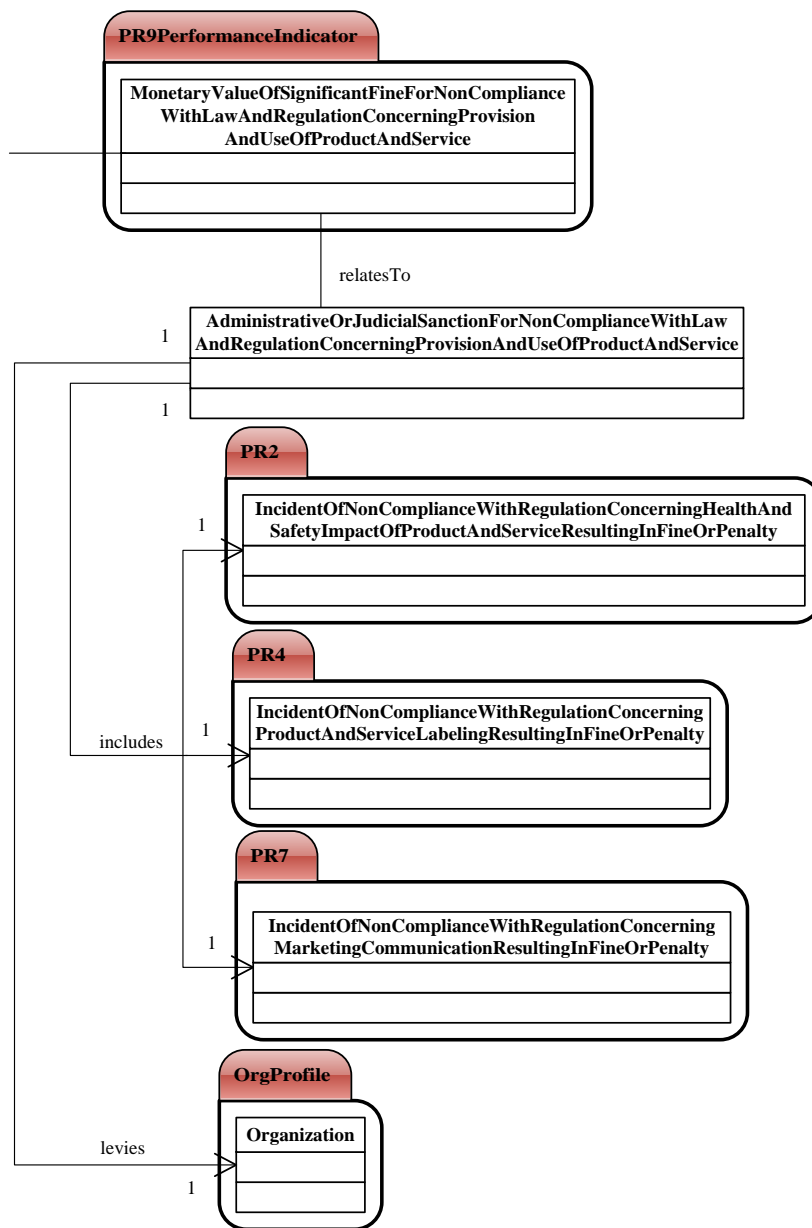


Figure 7.83 Ontology formalization for 'Monetary Value Of Significant Fine For Non-Compliance With Law And Regulation Concerning Provision And Use Of Product And Service Indicator' class

7.3. Summary

This chapter presents the ontology for the ‘Social Category’ class which is classified into four sub-categories: ‘Labor Practice and Decent Work’, ‘Human Rights’, ‘Society’, and ‘Product Responsibility’ classes. It explains ontology for eight Aspects for ‘Labor Practice and Decent Work’ class, tenth Aspects for ‘Human Rights’ class, seventh Aspects for ‘Society’ class, and fifth Aspects for ‘Product Responsibility’ class in regard to their indicators. The next chapter focuses on the ontology model created for Chapters 4 to 7.

Chapter 8. Implementation phase: Ontology Implementation and Evaluation

8.1. Introduction

In this chapter, the details of ontology implementation and evaluation are presented. The Australian companies' data used to implement ontology is reviewed in section 8.2. Then, in section 8.3 encoding the competency questions using OWL language and Protégé _5.0_ beta tool are used to transform competency questions into SPARQL queries. In section 8.4, the ontology is evaluated. Finally, the summary of this chapter is presented in section 8.5.

8.2. Overview of companies to implement ontology

The data that are used to implement the Ontology for Sustainability Report are from four Australian companies which are listed on the ASX for FY 2014. They belong to different sectors, industry groups, industries, and sub-industries, as shown in Table 8.1. Those companies are top ranked in terms of Market Capitalisation in their sub-industry. The data have been collected from

(<http://datanalysis.morningstar.com.au.dbgw.lis.curtin.edu.au/af/screening/advanced>).

Table 8.1 Australian companies' data used to implement ontology

	Company Name	ASX Code	Sector	Industry Group	Industry	Sub-Industry	Country of Incorporation
1	BHP Billiton	BHP	Materials	Materials	Metals and Mining	Diversified Metals and Mining	Australia
2	Trans-urban Group	TCL	Industrials	Transportation	Transportation Infrastructure	Highways and Rail tracks	Australia
3	Amcor Limited	AMC	Materials	Materials	Containers and Packaging	Paper Packaging	Australia
4	Origin Energy Limited	ORG	Energy	Energy	Oil, Gas and Consumable	Integrated Oil and Gas	Australia

The features of the experimental data and evaluation are summarized as follows:

1. Origin Energy Limited (OGR) is the leading Australian integrated energy company focusing on gas and oil exploration and production, power generation and energy retailing. It published its Sustainability Report for FY 2014 that can be accessed at www.originenergy.com.au/sustainability, and produced this report following GRI G4 guidelines in accordance with the Core option and United Nations, Guiding Principles on Business and Human Rights. It implements the United Nations' "Protect, Respect and Remedy" Framework, 2011. In this implementation, its data are used for creating instances of the ontology of 'General Standard Disclosure' class. The ORG instance data are used for the following indicators of the ontology: EC 7, EN 8, 9, 10, and 11 (partially), 14, 22, 24, and 34, LA 2, 5, 8, 6 (partially), 11 (partially), SO: 1, 2, 6, 11, and PR 5 and 7 (Limited 2014c, 2014b).
2. BHP Billiton is a leading diversified resources company. A FY 2014 sustainability report has been published in accordance with the GRI G3, including the Mining and Metals Sector Supplement. In addition, it applied International Council on Mining and Metals (ICMM), and United Nations Global Compact/ Human Rights in the report. This report is available on the BHP website at www.bhpbilliton.com. Although its report is in accordance with G3, it stated that 'We have included a number of G4 disclosures within this Sustainability Report' (Billiton 2014c, About BHP Billiton). In addition, it contains informative disclosures, in particular for economic and environmental indicators and human rights. Its data are used to create instances for some parts of G4-9, and five out of nine for EC indicator ontologies including EC 1, 2, 3, 6, and 9. Besides, its data instance are used to cover environmental and social performance indicators that are consistent with G4, including EN 3, 6, 7, 11(partially), 13, 15, 16, 17, 18, 19, 20, 21, 23, 27, and 29, LA 6 (Partially), 10, and 13, HR 3, 7, 8, and 10, and SO 8. The ORG and BHP data are chosen as the best disclosures (Billiton 2014c, 2014a, 2014b).
3. Transurban Group is the leader in Highways & Rail Tracks sub-industry in Australia. Its report is based on the GRI G4-Core option available from www.transurban.com/SR14 . Its data are used to create instances for the ontologies of G4-9 (partially), G4-10 (c, d), G4-11, LA1, 3, 4, 9, 12, and 16, HR2, and PR8 (Group 2014).

4. Amcor Limited is the largest supplier of flexible packaging in the world. It created a stand-alone form in accordance with the GRI G4 Core option, Accountability's AA1000 Assurance Standard (2008) and the Australian Standard on Assurance Engagements ASAE3000 (www.amcor.com). Data are used to create instances for the ontologies of G4-18, EN 1, 2 and 12, and part of LA6, and PR 2 (Limited 2014a).
5. TCL and AMC companies' data are used to complement the absences of the previous companies' data. A few data cannot be found in the above companies' reports according to G4. For example, the total number of employees in G4-9, point (c) and (d) for G4-10 in order to be consistent with LA 9, LA12.
6. Data instances of the above companies are used to implement the ontologies without duplication and are differentiated by the symbols: org, bhp, tcl, and amc that refer to Origin Energy Limited, BHP Billiton, Transurban Group, and Amcor Limited respectively data references.
7. ORG, TCL, and AMC are reported in accordance with the 'Core' option, so the evaluation and validation of the 'General Standard Disclosure' class is based on this option.
8. Data from these four companies are used to create instances for all the performance indicator ontologies.

To evaluate the ontologies, a total of 204 competency questions and 204 SPARQL queries are created which cover all the ontologies with instances. Due to space constraints, the competency questions and SPARQL queries are presented in this chapter and the SPARQL query results are in Appendix B.

8.3. Ontology coding

8.3.1. Definition of ontology coding

This phase builds computable models in a formal language or representation of conceptual models by using an ontology language (Stevens, Goble and Bechhofer 2000; Corcho, Fernández-López and Gómez-Pérez 2006; Corcho, Fernandez-Lopez and Gomez-Perez 2007). The requirements for the implementation phase are:

- A formal language that can be used to encode the ontology; and
- A tool that supports the ontology development activities.

In this implementation, Web Ontology Language (OWL) is used as a standard and broadly acceptable ontology language which defines classes, data properties, object properties, and individuals. Protégé_5.0_beta (protégé.stanford.edu) is used as a tool to create ontologies. Ontologies are stored as Semantic Web documents (W3C OWL Working Group, 2012) <http://www.w3.org/TR/2012/REC-owl2-overview-20121211/>. The full ontology coding is available at <http://www.semanticweb.org/14174782/ontologies/2014/6/csr#>.

In addition, only the following language elements are used:

Owl: Ontology, owl: Class, owl: ObjectProperty, owl: DatatypeProperty, rdfs: subClassOf, rdf: datatype, rdfs: domain, and rdf: range (Hepp 2008).

Therefore, all classes' object properties, and data properties identified and formalized throughout Chapters 4 to 7 are created in Protégé_5.0_beta. The instances of classes are referenced from the four Australian companies mentioned above.

According to the scope and purpose of ontology for a Sustainability Report specified in phase 1, stakeholders need information about general and specific standard disclosures, and therefore they raise questions. Competency questions are prepared as a standard technique in ontology engineering methodologies (Uschold and Gruninger 1996). Gruninger and M.S.Fox (1994) proposed competency questions as a methodology for evaluating ontologies. The query language is required to encode the competency questions appropriately (Vrandečić 2010).

8.3.2. Competency questions and SPARQL queries for 'General Standard Disclosure' class

In the exhaustive evaluation conducted in this study, 204 questions in natural language are detailed and cover all the instances in the ontology. All these questions are correct and complete. They are then transformed to SPARQL queries for inquiring the 'General Standard Disclosure' class and the 'Specific Standard Disclosure' class as follows. All solutions relating to each of the queries are provided in the attached Appendix B.

8.3.2.1. Competency questions and SPARQL query for the 'Strategy And Analysis' class

Table 8.2 Competency questions and SPARQL query for G4-1 'Statement From Most Senior Decision Maker Of Org' class

CQ1: Is general standard disclosure G4-1 required for either core or comprehensive options? What are the strategic priorities and key topics for the short and medium term with regard to sustainability? What key events, achievements, and failures were identified during the reporting period? For this company, what will be the main challenges and targets for the next year, and for the coming three to five years? What other aspects of this company's strategic approach need to be considered?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-1RequiredForEitherCoreOrComprehensiveOption ?object } csr:strategicPriorityandKeyTopicForShortMediumTermWithRegardToSustainability ?object } csr:keyEventAchievementFailureDuringReportingPeriod ?object } csr:mainChallengeandTargetForNextYearandGoalForComing3To5Year ?object } csr:otherItemPertainingToOrgStrategicApproach ?object } </pre>
SPARQL query's answer to CQ1 (a-e) in Appendix B.

Table 8.3 Competency questions and SPARQL query for G4-2 'Key Impact Risk And Opportunity' class

CQ2: Is general standard disclosure G4-2 required in accordance with core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-2RequiredInAccordanceWithCoreOption ?object } </pre>
SPARQL query's answer to CQ2 in Appendix B.

8.3.2.2. Competency questions and SPARQL query for 'Organizational Profile' class

Table 8.4 Competency questions and SPARQL query for G4-3 'Name Of Org' class

CQ3: Is general standard disclosure G4-3 required for either core or comprehensive options? What is the name of company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-3RequiredForEitherCoreOrComprehensiveOption ?object } csr:nameOfOrg ?object } </pre>
SPARQL query's answer to CQ3 (a-b) in Appendix B.

Table 8.5 Competency questions and SPARQL query for G4-4 'Primary Brand Product And Service' class

CQ4: Is general standard disclosure G4-4 required for either core or comprehensive options? What are the primary brands, products, and services for the company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-4RequiredForEitherCoreOrComprehensiveOption ?object } csr:primaryBrandProductandServiceName ?object } </pre>
SPARQL query's answer to CQ4 (a-b) in Appendix B.

Table 8.6 Competency questions and SPARQL query for G4-5 ‘Location Of Org Headquarters’ class

<p>CQ5: Is general standard disclosure G4-5 required for either core or comprehensive options? What is the location of the company’s headquarters?</p>
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-5RequiredForEitherCoreOrComprehensiveOption ?object } csr:locationOfOrgHeadquartersName ?object }</pre>
<p>SPARQL query’s answer to CQ5 (a-b) in Appendix B.</p>

Table 8.7 Competency questions and SPARQL query for G4-6 ‘Number Of Country Where Org Operate And Name Of Country Where Either Org Has Significant Operation Or Specifically Relevant To Sustainability Topic Covered In Report’ class

<p>CQ6: Is general standard disclosure G4-6 required for either core or comprehensive options? How many countries does this company operate in? In which countries does the company undertake significant operations or practices that are specifically relevant to sustainability topics covered in this report?</p>
<p>SPARQL query</p> <pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-6RequiredForEitherCoreOrComprehensiveOption ?object } csr:numberOfCountryWhereOrgOperate ?object } csr:nameOfCountryWhereEitherOrgHasSignificantOperationOrSpecificallyRelevantToSustainability TopicCoveredInReport ?object }</pre>
<p>SPARQL query’s answer to CQ6 (a-c) in Appendix B.</p>

Table 8.8 Competency questions and SPARQL query for G4-7 ‘Nature Of Ownership And Legal Form’ class

CQ7: Is general standard disclosure G4-7 required for either core or comprehensive options? Report the nature of ownership and legal form of the company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-7RequiredForEitherCoreOrComprehensiveOption ?object } csr:natureOfOwnershipandLegalForm ?object } </pre>
SPARQL query’s answer to CQ7 (a-b) in Appendix B.

Table 8.9 Competency questions and SPARQL query for G4-8 ‘Market Served’ class

CQ8: Is general standard disclosure G4-8 required for either core or comprehensive options? What markets, including geographic breakdown, sectors, types of customers, and beneficiaries, are served by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-8RequiredForEitherCoreOrComprehensiveOption ?object } csr:marketIncludingGeographicBreakdownSectorTypeOfCustomerandBeneficiaryServedByOrg ?object } </pre>
SPARQL query’s answer to CQ8 (a-b) in Appendix B.

Table 8.10 Competency questions and SPARQL query for G4-9 ‘Scale Of Organization’ class

<p>CQ9: Is general standard disclosure G4-9 required for either core or comprehensive options? What is the total number of employees in this company? What is the total number of operations conducted by this company? What is this company’s net revenue and the unit of currency used to measure it? What is the company’s total capitalization? What quantity of products or services does the company provide?</p>
<p>SPARQL query</p>
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-9RequiredForEitherCoreOrComprehensiveOption ?object } csr:totalNumberOfEmployee ?object } csr:totalNumberOfOperation ?object } csr:netRevenueandMeasurementUnitOfCurrency ?object } csr:totalCapitalizationBrokenDownInTermOfDebtandEquityandMeasurementUnitOfCurrency ?object} csr:quantityOfProductOrServiceProvided ?object } </pre>
<p>SPARQL query’s answer to CQ9 (a-f) in Appendix B.</p>

Table 8.11 Competency questions and SPARQL query for G4-10 ‘Employment Overview’ class

<p>CQ10: Is general standard disclosure G4-10 required for either core or comprehensive options? What is the total number of employees by employment contract and gender? What is the total number of employees by permanent employment type and gender? What is the total workforce by employees, supervised workers, and by gender? What is the total of workforces by region and gender? Are there any significant variations in employment numbers?</p>
<p>SPARQL query</p>
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-10RequiredForEitherCoreOrComprehensiveOption ?object } csr:totalNumberOfEmployeeByEmploymentContractandGender ?object } csr:totalNumberOfPermanentEmployeeByEmploymentTypeandGender ?object } csr:totalWorkforceByEmployeeandSupervisedWorkerandByGender ?object } csr:totalWorkforceByRegionandGender ?object } csr:significantVariationInEmploymentNumber ?object } </pre>
<p>SPARQL query’s answer to CQ10 (a-f) in Appendix B.</p>

Table 8.12 Competency questions and SPARQL query for G4-11 ‘Collective Bargaining Agreement’ class

<p>CQ11: Is general standard disclosure G4-11 required for either core or comprehensive options? What is the percentage of total employees covered by collective bargaining agreements in this company?</p>
<p>SPARQL query</p>
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-11RequiredForEitherCoreOrComprehensiveOption ?object } csr:percentageOfTotalEmployeeCoveredByCollectiveBargainingAgreement ?object } </pre>
<p>SPARQL query’s answer to CQ11 (a-b) in Appendix B.</p>

Table 8.13 Competency questions and SPARQL query for G4-12 ‘Org Supply Chain’ class

CQ12: Is general standard disclosure G4-12 required for either core or comprehensive options? Describe the company’s supply chain.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-12RequiredForEitherCoreOrComprehensiveOption ?object } csr:describeOrgSupplyChain ?object } </pre>
SPARQL query’s answer to CQ12 (a-b) in Appendix B.

Table 8.14 Competency questions and SPARQL query for G4-13 ‘Significant Change During Reporting Period Regarding Org Size Structure Ownership Supply Chain’ class

CQ13: Is general standard disclosure G4-13 required for either core or comprehensive options? Report any significant changes during the reporting period with regard to the company’s size, structure, ownership, and supply chain?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-13RequiredForEitherCoreOrComprehensiveOption ?object } csr:changeInLocationOfOrChangeInOperationIncludingFacilityOpeningClosingand Expansion ?object } </pre>
SPARQL query’s answer to CQ13 (a-b) in Appendix B.

Table 8.15 Competency questions and SPARQL query for ‘Commitment To External Initiative’ class and Competency questions and SPARQL query for G4-14 ‘Precautionary Approach Or Principle Addressed By Org’ class

CQ14: Is general standard disclosure G4-14 required for either core or comprehensive options? Report whether and how the precautionary approach or principle is addressed by this company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-14RequiredForEitherCoreOrComprehensiveOption ?object } csr:whetherandHowPrecautionaryApproachOrPrincipleIsAddressedByOrg ?object } </pre>
SPARQL query’s answer to CQ14 (a-b) in Appendix B.

Table 8.16 Competency questions and SPARQL query for G4-15 ‘External Developed Economic Environmental And Social Charter Principle Or Other Initiative To Which Org Subscribe’ class

CQ15: Is general standard disclosure G4-15 required for either core or comprehensive options? List externally developed economic environmental and social charter principles or other initiatives to which the company subscribes.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-15RequiredForEitherCoreOrComprehensiveOption ?object } csr:listExternalDevelopedEconomicEnvironmentalandSocialCharterPrincipleOrOtherInitiativeToWhichOrgSubscribe ?object} </pre>
SPARQL query’s answer to CQ15 (a-b) in Appendix B.

Table 8.17 Competency questions and SPARQL query for G4-16 ‘Membership Of Association And National Or International Advocacy Org’ class

CQ16: Is general standard disclosure G4-16 required for either core or comprehensive options? List membership of associations and national or international advocacy company in which the company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-16RequiredForEitherCoreOrComprehensiveOption ?object } csr:listMembershipOfAssociationandNationalOrInternationalAdvocacyOrgInWhichOrgHoldParticipateProvideView ?object} </pre>
SPARQL query’s answer to CQ16 (a-b) in Appendix B.

8.3.2.3. Competency questions and SPARQL query for ‘Identified Material Aspect And Boundary’ class

Table 8.18 Competency questions and SPARQL query for G4-17 ‘Entity Included In Org Consolidated Financial Statement Or Equivalent Document’ class

CQ17: Is general standard disclosure G4-17 required for either core or comprehensive options? List all entities included in the company’s consolidated financial statements or equivalent documents. Report whether any entity included in the company’s consolidated financial statement or equivalent document is not covered by sustainability report. Name any entity included in the company’s consolidated financial statement or equivalent document that is not covered by the sustainability report.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-17RequiredForEitherCoreOrComprehensiveOption ?object } csr:listAllEntityIncludedInOrgConsolidatedFinancialStatementOrEquivalentDocument ?object} csr:whetherEntityIncludedInOrgConsolidatedFinancialStatemenOrEquivalent DocumentIsNotCoveredBySustainabilityReport ?object } csr:nameOfEntityIncludedInOrgConsolidatedFinancialStatemenOrEquivalentDocumentIsNotCovered BySustainabilityReport ?object } </pre>
SPARQL query’s answer to CQ17 (a-d) in Appendix B.

Table 8.19 Competency questions and SPARQL query for G4-18 ‘Defining Report Content And Aspect Boundary Process’ class

CQ18: Is general standard disclosure G4-18 required for either core or comprehensive options? Explain the process used for defining the report content and Aspect Boundaries.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-18RequiredForEitherCoreOrComprehensiveOption ?object } csr:explainProcessForDefiningReportContentandAspectBoundary ?object } </pre>
SPARQL query’s answer to CQ18 (a-b) in Appendix B.

Table 8.20 Competency questions and SPARQL query for G4-19 ‘All Material Aspect Identified In Process For Defining Report Content’ class

CQ19: Is general standard disclosure G4-19 required for either core or comprehensive options? List all material Aspects identified in the process of defining the report content.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-19RequiredForEitherCoreOrComprehensiveOption ?object } csr:listAllMaterialAspectIdentifiedInProcessForDefiningReportContent ?object } </pre>
SPARQL query’s answer to CQ19 (a-b) in Appendix B.

Table 8.21 Competency questions and SPARQL query for G4-20 ‘Aspect Boundary For Material Aspect Within Org’ class

<p>CQ20: Is general standard disclosure G4-20 required for either core or comprehensive options? Report whether the Aspect Boundary is material within the company. Report the Aspect Boundary for each material Aspect within the company.</p>
<p>SPARQL query</p>
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-0RequiredForEitherCoreOrComprehensiveOption ?object } csr:whetherAspectBoundaryIsMaterialWithinOrg ?object} csr:aspectBoundaryForMaterialAspectWithinOrg ?object}</pre>
<p>SPARQL query’s answer to CQ20 (a-c) in Appendix B.</p>

Table 8.22 Competency questions and SPARQL query for G4-21 ‘Aspect Boundary For Material Aspect Outside Org’ class

<p>CQ21: Is general standard disclosure G4-21 required for either core or comprehensive options? Report whether Aspect Boundary is material outside of the company. Identify entities, groups of entities or elements for which Aspect is material and describe geographical location of these entities.</p>
<p>SPARQL query</p>
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-21RequiredForEitherCoreOrComprehensiveOption ?object } csr:whetherBoundaryAspectIsMaterialOutsideOfOrg ?object } csr:identifyEntityGroupOfEntityOrElementForWhichAspectIsMaterialandDescribe GeographicalLocationForEntityIdentified ?object}</pre>
<p>SPARQL query’s answer to CQ21 (a-c) in Appendix B.</p>

Table 8.23 Competency questions and SPARQL query for G4-22 ‘Effect And Reason For Restatement Of Information Provided In Previous Report’ class

CQ22: Is general standard disclosure G4-22 required for either core or comprehensive options? Report the effect and reasons of any restatements of information provided in previous reports.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-22RequiredForEitherCoreOrComprehensiveOption ?object } csr:effectandReasonOfRestatementOfInformationProvidedInPreviousReport ?object} </pre>
SPARQL query’s answer to CQ22 (a-b) in Appendix B.

Table 8.24 Competency questions and SPARQL query for G4-23 ‘Significant Change From Previous Reporting Period In Scope And Aspect Boundary’ class

CQ23: Is general standard disclosure G4-23 required for either core or comprehensive options? Report significant changes from previous reporting periods in the scope and Aspect Boundaries.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-23RequiredForEitherCoreOrComprehensiveOption ?object } csr:significantChangeFromPreviousReportingPeriodInScopeandAspectBoundary ?object} </pre>
SPARQL query’s answer to CQ23 (a-b) in Appendix B.

8.3.2.4. Competency questions and SPARQL query for ‘Stakeholder Engagement’ class

Table 8.25 Competency questions and SPARQL query for G4-24 ‘Stakeholder Group Engaged By Org’ class

CQ24: Is general standard disclosure G4-24 required for either core or comprehensive options? List the stakeholder groups engaged by the organization.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-24RequiredForEitherCoreOrComprehensiveOption ?object } csr:listOfStakeholderGroupEngagedByOrg ?object } </pre>
SPARQL query’s answer to CQ24 (a-b) in Appendix B.

Table 8.26 Competency questions and SPARQL query for G4-25 ‘Basis For Identification And Selection Of Stakeholder With Whom To Engage’ class

CQ25: Is general standard disclosure G4-25 required for either core or comprehensive options? Report the basis for identification and selection of stakeholders with whom to engage.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-25RequiredForEitherCoreOrComprehensiveOption ?object } csr:basisForIdentificationandSelectionOfStakeholderWithWhomToEngage ?object } </pre>
SPARQL query’s answer to CQ25 (a-b) in Appendix B.

Table 8.27 Competency questions and SPARQL query for G4-26 ‘Org Approach To Stakeholder Engagement’ class

CQ26: Is general standard disclosure G4-26 required for either core or comprehensive options? Report the company’s approach to stakeholder engagement.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-26RequiredForEitherCoreOrComprehensiveOption ?object } csr:orgApproachToStakeholderEngagement ?object } </pre>
SPARQL query’s answer to CQ26 (a-b) in Appendix B.

Table 8.28 Competency questions and SPARQL query for G4-27 ‘Key Topic And Concern Raised Through Stakeholder Engagement’ class

CQ27: Is general standard disclosure G4-27 required for either core or comprehensive options? What are the key topics and concerns that have been raised through stakeholder engagement?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-27RequiredForEitherCoreOrComprehensiveOption ?object } csr:keyTopicandConcernThatHasBeenRaisedThroughStakeholderEngagement ?object } </pre>
SPARQL query’s answer to CQ27 (a-b) in Appendix B.

Table 8.29 Competency questions and SPARQL query for ‘Report Profile’ class and G4-28 ‘Reporting Period’ class

CQ28: Is general standard disclosure G4-28 required for either core or comprehensive options? What is the reporting period for information provided in the company’s Sustainability Report?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-28RequiredForEitherCoreOrComprehensiveOption ?object } csr:reportingPeriodForInformationProvided ?object } </pre>
SPARQL query’s answer to CQ28 (a-b) in Appendix B.

Table 8.30 Competency questions and SPARQL query for G4-29 ‘Date Of Most Recent Previous Report’ class

CQ29: Is general standard disclosure G4-29 required for either core or comprehensive options? What is the most recent previous report?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-29RequiredForEitherCoreOrComprehensiveOption ?object } csr:dateOfMostRecentPreviousReport ?object } </pre>
SPARQL query’s answer to CQ29 (a-b) in Appendix B.

Table 8.31 Competency questions and SPARQL query for G4-30 ‘Reporting Cycle’ class

CQ30: Is general standard disclosure G4-30 required for either core or comprehensive options? What is the company’s reporting cycle type? (For example, annual, biennial).
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-30RequiredForEitherCoreOrComprehensiveOption ?object } csr:reportingCycleType ?object } </pre>
SPARQL query’s answer to CQ30 (a-b) in Appendix B.

Table 8.32 Competency questions and SPARQL query for G4-31 ‘Contact Point For Questions Regarding Report Or Report Content’ class

CQ31: Is general standard disclosure G4-31 required for either core or comprehensive options? What is the contact point for questions regarding the report or its contents?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-31RequiredForEitherCoreOrComprehensiveOption ?object } csr:contactPointForQuestionRegardingReportOrReportContent ?object } </pre>
SPARQL query’s answer to CQ31 (a-b) in Appendix B.

Table 8.33 Competency questions and SPARQL query for G4-32 ‘GRI Content Index’ class

CQ32: Is general standard disclosure G4-32 required for either core or comprehensive options? What ‘in accordance’ option has the company chosen? What is the reference to the External Assurance Report, if the report has been externally assured?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-32RequiredForEitherCoreOrComprehensiveOption ?object } csr:inAccordanceOptionOrgHasChosen ?object } csr:referenceToExternalAssuranceReportIfReportHasBeenExternallyAssured ?object } </pre>
SPARQL query’s answer to CQ32 (a-c) in Appendix B.

Table 8.34 Competency questions and SPARQL query for G4-33 ‘Assurance’ class

CQ 33: Is general standard disclosure G4-33 required for either core or comprehensive options? What is the company’s policy and current practice with regard to seeking external assurance for the Sustainability report? What is the scope and basis of any external assurance provided? What is the relationship between the company and its assurance provider?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-33RequiredForEitherCoreOrComprehensiveOption ?object } csr:orgPolicyandCurrentPracticeWithRegardToSeekingExternalAssurance ?object } csr:scopeandBasisOfExternalAssuranceProvided ?object } csr:relationshipBetweenOrgandAssuranceProvider ?object } </pre>
SPARQL query’s answer to CQ33 (a-d) in Appendix B.

8.3.2.5. Competency questions and SPARQL query for 'Governance' class

8.3.2.5.1. Competency questions and SPARQL query for 'Governance Structure And Composition' class

Table 8.35 Competency questions and SPARQL query for G4-34 'Governance Structure Of Org' class

CQ34: Is general standard disclosure G4-34 required for either core or comprehensive options? What is the governance structure of the company, including the make-up of the highest governance body working committee? What committees are responsible for decision-making on economic, environmental and social impacts?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-34RequiredForEitherCoreOrComprehensiveOption ?object } csr:governanceStructureOfOrgIncludingCommitteeOfHighestGovernanceBody ?object } csr:identifyCommitteeResponsibleForDecisionMakingOnSustainabilityImpact ?object } </pre>
SPARQL query's answer to CQ34 (a-c) in Appendix B.

Table 8.36 Competency questions and SPARQL query for G4-35 'Process For Delegating Authority For Sustainability Topic' class

CQ35: Is general standard disclosure G4-35 required in accordance with the core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-35RequiredInAccordanceWithCoreOption ?object } </pre>
SPARQL query's answer to CQ35 in Appendix B.

Table 8.37 Competency questions and SPARQL query for G4-36 ‘Appointed Executive Level Position With Responsibility For Sustainability Topic’ class

CQ36: Is general standard disclosure G4-36 required in accordance with the core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-36RequiredInAccordanceWithCoreOption ?object } </pre>
SPARQL query’s answer to CQ36 in Appendix B.

Table 8.38 Competency questions and SPARQL query for G4-37 ‘Process For Consultation Between Stakeholder And Highest Governance Body On Sustainability Topic’ class

CQ37: Is general standard disclosure G4-37 required in accordance with the core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-37RequiredInAccordanceWithCoreOption ?object } </pre>
SPARQL query’s answer to CQ37 in Appendix B.

Table 8.39 Competency questions and SPARQL query for G4-38 ‘Composition Of Highest Governance Body And Highest Governance Body Committee’ class

CQ38: Is general standard disclosure G4-38 required in accordance with the core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-38RequiredInAccordanceWithCoreOption ?object } </pre>
SPARQL query’s answer to CQ38 in Appendix B.

Table 8.40 Competency questions and SPARQL query for G4-39 ‘Chair Of Highest Governance Body’ class

CQ39: Is general standard disclosure G4-39 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-39RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ39 in Appendix B.

Table 8.41 Competency questions and SPARQL query for G4-40 ‘Nomination And Selection Process For Highest Governance Body Committee And Criteria Used’ class

CQ40: Is general standard disclosure G4-40 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-40RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ40 in Appendix B.

Table 8.42 Competency questions and SPARQL query for G4-41 ‘Process For Highest Governance Body To Ensure Conflict Of Interest Avoiding And Managing’ class

CQ41: Is general standard disclosure G4-41 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-41RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ41 in Appendix B.

Table 8.43 Competency questions and SPARQL query for G4-42 ‘Highest Governance Body Role In Setting Purpose Value And Strategy’ class

CQ42: Is general standard disclosure G4-42 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-42RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ42 in Appendix B.

Table 8.44 Competency questions and SPARQL query for G4-43 ‘Measure Taken To Develop And Enhance Highest Governance Body Collective Knowledge Of Sustainability Topic’ class

CQ43: Is general standard disclosure G4-43 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-43RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ43 in Appendix B.

Table 8.45 Competency questions and SPARQL query for G4-44 ‘Process For Evaluation And Action Taken In Response To Evaluation Of Highest Governance Body Performance’ class

CQ44: Is general standard disclosure G4-44 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-44RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ44 in Appendix B.

Table 8.46 Competency questions and SPARQL query for G4-45 ‘Highest Governance Body Role In Identification And Management Of Sustainability Impact Risk And Opportunity’ class

CQ45: Is general standard disclosure G4-45 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-45RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ45 in Appendix B.

Table 8.47 8.47 Competency questions and SPARQL query for G4-46 ‘Highest Governance Body Role In Reviewing Effectiveness Of Org Risk Management Process For Sustainability Topic’ class

CQ46: Is general standard disclosure G4-46 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-46RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ46 in Appendix B.

Table 8.48 Competency questions and SPARQL query for G4-47 ‘Frequency Of Highest Governance Body Review Of Sustainability Impact Risk And Opportunity’ class

CQ47: Is general standard disclosure G4-47 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-47RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ47 in Appendix B.

Table 8.49 Competency questions and SPARQL query for G4-48 ‘Highest Committee Or Position That Formally Review And Approve Org Sustainability Report and Ensure Covering All Material Aspects’ class

CQ48: Is general standard disclosure G4-48 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-48RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ48 in Appendix B.

Table 8.50 Competency questions and SPARQL query for G4-49 ‘Process For Communicating Critical Concern To Highest Governance Body’ class

CQ 49: Is general standard disclosure G4-49 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-49RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ49 in Appendix B.

Table 8.51 Competency questions and SPARQL query for G4-50 ‘Nature And Total Number Of Critical Concern’ class

CQ 50: Is general standard disclosure G4-50 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-50RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ50 in Appendix B.

Table 8.52 Competency questions and SPARQL query for G4-51 ‘Remuneration Policy For Highest Governance Body And Senior Executive’ class

CQ51: Is general standard disclosure G4-51 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-51RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ51 in Appendix B.

Table 8.53 Competency questions and SPARQL query for G4-52 ‘Process For Determining Remuneration’ class

CQ52: Is general standard disclosure G4-52 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-52RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ52 in Appendix B.

Table 8.54 Competency questions and SPARQL query for G4-53 ‘How Stakeholder View Is Sought And Taken Into Account Regarding Remuneration’ class

CQ53: Is general standard disclosure G4-53 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-53RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ53 in Appendix B.

Table 8.55 Competency questions and SPARQL query for G4-54 ‘Ratio Of Annual Total Compensation For Org Highest Paid Individual In Each Country Of Significant Operation’ class

CQ54: Is general standard disclosure G4-54 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-54RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ54 in Appendix B.

Table 8.56 Competency questions and SPARQL query for G4-55 ‘Ratio Of Percentage Increase In Annual Total Compensation For Org Highest Paid Individual In Each Country Of Significant Operation’ class

CQ55: Is general standard disclosure G4-55 required in accordance with the core option?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-55RequiredInAccordanceWithCoreOption ?object }</pre>
SPARQL query’s answer to CQ55 in Appendix B.

8.3.2.6. Competency questions and SPARQL query for ‘Ethic And Integrity’ class

Table 8.57 Competency questions and SPARQL query for G4-56 ‘Org Value Principle Standard And Norm Of Behavior’ class

CQ56: Is general standard disclosure G4-56 required for either core or comprehensive options? Describe the company’s values, principles, standard and behavioral norms.
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-56RequiredForEitherCoreOrComprehensiveOption ?object } csr:describeOrgValuePrincipleStandardandNormOfBehavior ?object }</pre>
SPARQL query’s answer to CQ56 (a-b) in Appendix B.

Table 8.58 Competency questions and SPARQL query for G4-57 ‘Internal And External Mechanism For Seeking Advice On Ethical And Lawful Behavior And Matter Related To Org Integrity’ class

CQ57: Is general standard disclosure G4-57 required in accordance with the core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-57RequiredInAccordanceWithCoreOption?object } </pre>
SPARQL query’s answer to CQ57 in Appendix B.

Table 8.59 Competency questions and SPARQL query for G4-58 ‘Internal And External Mechanism For Reporting Concern About Unethical Or Unlawful Behavior And Matter Related To Org Integrity’ class

CQ58: Is general standard disclosure G4-58 required in accordance with the core option?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:isGeneralStandardDisclosureG4-58RequiredInAccordanceWithCoreOption ?object } </pre>
SPARQL query’s answer to CQ58 in Appendix B.

8.3.3. Competency questions and SPARQL query for 'Specific Standard Disclosure' class

8.3.3.1. Competency questions and SPARQL query for 'Economic Aspect' class

8.3.3.1.1. Competency questions and SPARQL query for 'Economic Performance Aspect' class

8.3.3.1.1.1. Competency questions and SPARQL query for EC1: 'Direct Economic Value Generated And Distributed Indicator' class

Table 8.60 Competency questions and SPARQL query for 'Economic Value Retained' class

CQ59: What is the total value of the economic value retained, by region, basis, and measurement unit currency for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:economicValueRetainedBasis ?object } csr:regionNameForEconomicValueRetained ?object } csr:totalValueOfEconomicValueRetained ?object } csr:totalValueOfEconomicValueRetainedByRegion ?object } csr:measurementUnitCurrency ?object }</pre>
SPARQL query's answer to CQ59 (a-e) in Appendix B.

Table 8.61 Competency questions and SPARQL query for ‘Direct Economic Value Generated’ class

CQ60: What is the total value of direct economic value generated, by region, basis, and measurement unit currency for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:directEconomicValueGeneratedBasis ?object } csr:regionNameForDirectEconomicValueGenerated ?object } csr:totalValueOfDirectEconomicValueGenerated ?object } csr:totalValueOfDirectEconomicValueGeneratedByRegion ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ60 (a-e) in Appendix B.

Table 8.62 Competency questions and SPARQL query for ‘Revenue’ class

CQ61: What is the total value of revenue by region, basis, and measurement unit currency for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:revenueName csr:revenueandOtherIncomeBasis ?object } csr:regionNameForRevenueandOtherIncome ?object } csr:totalValueOfRevenueandOtherIncome ?object } csr:totalValueOfRevenueandOtherIncomeByRegion ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ61 (a-f) in Appendix B.

Table 8.63 Competency questions and SPARQL query for ‘Economic Value Distributed’ class

CQ62: What is the total value of economic value distributed by region, basis, and unit of currency used for such measurement by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:economicValueDistributedBasis ?object } csr:regionNameForEconomicValueDistributed ?object } csr:totalValueOfEconomicValueDistributed ?object } csr:totalValueOfEconomicValueDistributedByRegion ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ62 (a-e) in Appendix B.

Table 8.64 Competency questions and SPARQL query for ‘Operating Cost’ class

CQ63: What is the total value of operating costs by, region, basis, name, and unit of currency for that measurement for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:operatingCostBasis ?object } csr:operatingCostName ?object } csr:regionNameForOperatingCost ?object } csr:totalValueOfPaymentToSupplierContractorByRegion ?object } csr:totalValueOfOperatingCost ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ63 (a-f) in Appendix B.

Table 8.65 Competency questions and SPARQL query for ‘Employee Wage And Benefit’ class

CQ64: What is the total value of employee wage and benefit by, region, basis, and unit of currency for such measurement by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:employeeWageandBenefitBasis ?object } csr:regionNameForEmployeeWageandBenefit ?object } csr:totalValueOfEmployeeWageandBenefitByRegion ?object } csr:totalValueOfEmployeeWageandBenefit ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ64 (a-e) in Appendix B.

Table 8.66 Competency questions and SPARQL query for ‘Payment To Provider Of Capital’ class

CQ65: What kinds of payments does the company make to the providers of capital?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:kindOfPaymentToProviderOfCapital ?object } </pre>
SPARQL query’s answer to CQ65 in Appendix B.

Table 8.67 Competency questions and SPARQL query for ‘Payment To Shareholder Dividend’ class

CQ66: What is the total value of Payment To Shareholder Dividend by, basis, region, name, and the unit of currency used for such measurement by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:paymentToShareholderDividendBasis ?object } csr:regionNameForPaymentToShareholderDividend ?object } csr:totalValueOfPaymentToShareholderDividendByRegion ?object } csr:totalValueOfPaymentToShareholderDividend ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ66 (a-f) in Appendix B.

Table 8.68 Competency questions and SPARQL query for ‘Interest Payment’ class

CQ67: What is the total value of Interest Payment by region, basis, name, and unit of currency used for such measurement by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:interestPaymentBasis ?object } csr:regionNameForInterestPayment ?object } csr:totalValueOfInterestPaymentByRegion ?object } csr:totalValueOfInterestPayment ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ67 (a-e) in Appendix B.

Table 8.69 Competency questions and SPARQL query for ‘Payment To Government’ class

CQ68: What is the total value of Payment To Government by region, basis, and measurement unit currency for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:paymentToGovernmentBasis ?object } csr:paymentToGovernmentName ?object } csr:regionNameForPaymentToGovernment ?object } csr:totalValueOfPaymentToGrossTaxandRoyaltyByRegion ?object } csr:totalValueOfPaymentToGovernment ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ68 (a-f) in Appendix B.

Table 8.70 Competency questions and SPARQL query for ‘Community Investment’ class

CQ69: What are the total volunteer community investment, basis, community investment expenditure by region name, by program category, and the unit of currency used for that measurement for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:communityInvestmentBasis ?object } csr:totalValueOfVoluntaryCommunityInvestment ?object } csr:regionNameForCommunityInvestmentExpenditure ?object } csr:communityInvestmentExpenditureByProgramCategory ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ69 (a-e) in Appendix B.

8.3.3.1.1.2. Competency questions and SPARQL query for EC2: ‘Financial Implication And Other Risk And Opportunity For Org Activity Due To Climate Change Indicator’ class

8.3.3.1.1.2.1. Competency questions and SPARQL query for ‘Climate Change Risk’ class

Table 8.71 Competency questions and SPARQL query for ‘Physical Risk’ class

CQ70: Describe Physical Risk in terms of driver, description, potential impact, time frame, direct and indirect impact, likelihood, magnitude of impact, financial implications, methods used to manage the risk, and cost of management for this company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:physicalRiskDriver ?object } csr:descriptionOfPhysicalRisk ?object } csr:potentialImpactOfPhysicalRisk ?object } csr:timeFrameOfPhysicalRisk ?object } csr:directandIndirectImpactOfPhysicalRisk ?object } csr:likelihoodOfPhysicalRisk ?object } csr:magnitudeOfImpactForPhysicalRisk ?object } csr:financialImplicationOfPhysicalRisk ?object } csr:managementMethodOfPhysicalRisk ?object } csr:costOfManagementForPhysicalRisk ?object } </pre>
SPARQL query’s answer to CQ70 (a-j) in Appendix B.

Table 8.72 Competency questions and SPARQL query for ‘Regulatory Risk’ class

CQ71: Describe Regulatory Risk in terms of drivers, description, potential impact, time frame, direct and indirect impact, likelihood, magnitude of impact, financial implications, methods used to manage the risk, and cost of management for this company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:regulatoryRiskDriver ?object } csr:descriptionOfRegulatoryRisk ?object } csr:potentialImpactOfRegulatoryRisk ?object } csr:timeFrameOfRegulatoryRisk ?object } csr:directandIndirectImpactOfRegulatoryRisk ?object } csr:likelihoodOfRegulatoryRisk ?object } csr:magnitudeOfImpactForRegulatoryRisk ?object } csr:financialImplicationOfRegulatoryRisk ?object } csr:managementMethodOfRegulatoryRisk ?object } csr:costOfManagementForRegulatoryRisk ?object } </pre>
SPARQL query’s answer to CQ71 (a-j) in Appendix B.

Table 8.73 Competency questions and SPARQL query for ‘Other Risk’ class

CQ72: Describe Other Risks in terms of drivers, description, potential impact, time frame, direct and indirect impact, likelihood, magnitude of impact, financial implications, methods used to manage the risk, and cost of management for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:otherRiskDriver ?object } csr:descriptionOfOtherRisk ?object } csr:potentialImpactOfOtherRisk ?object } csr:timeFrameOfOtherRisk ?object } csr:directandIndirectImpactOfOtherRisk ?object } csr:likelihoodOfOtherRisk ?object } csr:magnitudeOfImpactForOtherRisk ?object } csr:financialImplicationOfOtherRisk ?object } csr:managementMethodOfOtherRisk ?object } csr:costOfManagementForOtherRisk ?object } </pre>
SPARQL query’s answer to CQ72 (a-j) in Appendix B.

8.3.3.1.1.2.2. Competency questions and SPARQL query for 'Climate Change Opportunity' class

Table 8.74 Competency questions and SPARQL query for 'Physical Opportunity' class

CQ73: Describe Physical Opportunity in terms of driver, description, potential impact, time frame, direct and indirect impact, likelihood, magnitude of impact, financial implications, methods used to manage the risk, and cost of management for this company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:physicalOpportunityDriver ?object } csr:descriptionOfPhysicalOpportunity ?object } csr:potentialImpactOfPhysicalOpportunity ?object } csr:timeFrameOfPhysicalOpportunity ?object } csr:directandIndirectImpactOfPhysicalOpportunity ?object } csr:likelihoodOfPhysicalOpportunity ?object } csr:magnitudeOfImpactForPhysicalOpportunity ?object } csr:financialImplicationOfPhysicalOpportunity ?object } csr:managementMethodOfPhysicalOpportunity ?object } csr:costOfManagementForPhysicalOpportunity ?object } </pre>
SPARQL query's answer to CQ73 (a-j) in Appendix B.

Table 8.75 Competency questions and SPARQL query for ‘Regulatory Opportunity’ class

CQ74: Describe Regulatory Opportunity in terms of driver, description, potential impact, time frame, direct and indirect impact, likelihood, magnitude of impact, financial implications, methods used to manage the risk, and cost of management for this company.
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:regulatoryOpportunityDriver ?object } csr:descriptionOfRegulatoryOpportunity ?object } csr:potentialImpactOfRegulatoryOpportunity ?object } csr:timeFrameOfRegulatoryOpportunity ?object } csr:directandIndirectImpactOfRegulatoryOpportunity ?object } csr:likelihoodOfRegulatoryOpportunity ?object } csr:magnitudeOfImpactForRegulatoryOpportunity ?object } csr:financialImplicationOfRegulatoryOpportunity ?object } csr:managementMethodOfRegulatoryOpportunity ?object } csr:costOfManagementForRegulatoryOpportunity ?object } </pre>
SPARQL query’s answer to CQ74 (a-j) in Appendix B.

Table 8.76 Competency questions and SPARQL query for ‘Other Opportunity’ class

CQ75: Describe Other Opportunities in terms of driver, description, potential impact, time frame, direct and indirect impact, likelihood, magnitude of impact, financial implications, methods used to manage the risk, and cost of management for this company.
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:otherOpportunityDriver ?object } csr:descriptionOfOtherOpportunity ?object } csr:potentialImpactOfOtherOpportunity ?object } csr:timeFrameOfOtherOpportunity ?object } csr:directandIndirectImpactOfOtherOpportunity ?object } csr:likelihoodOfOtherOpportunity ?object } csr:magnitudeOfImpactForOtherOpportunity ?object } csr:financialImplicationOfOtherOpportunity ?object } csr:managementMethodOfOtherOpportunity ?object } csr:costOfManagementForOtherOpportunity ?object }</pre>
SPARQL query’s answer to CQ75 (a-j) in Appendix B.

8.3.3.1.1.3. Competency questions and SPARQL query for EC3: ‘Coverage Of Org Defined Benefit Plan Obligation Indicator’ class

Table 8.77 Competency questions and SPARQL query for ‘Separate Fund’ class

CQ76: What is the scheme liability name, the extent to which defined benefit pension scheme is estimated, the fair value of scheme asset to meet defined benefit pension scheme, the basis on which those estimates have been determined, when those estimates were made, the time scale to achieve full coverage by the employer, the strategy adopted by the employer to work towards full coverage, and the unit of currency used for measurement for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:schemeLiabilityName ?object } csr:extentToWhichDefinedBenefitPensionSchemeIsEstimated ?object } csr:fairValueOfSchemeAssetToMeetDefinedBenefitPensionScheme ?object } csr:basisOnWhichThatEstimateHasBeenArrived ?object } csr:whenThatEstimateWasMade ?object } csr:timeScaleToAchieveFullCoverageByEmployerForDefinedBenefitPensionScheme ?object } csr:strategyAdoptedByEmployerToWorkTowardFullCoverage ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ76 (a-h) in Appendix B.

Table 8.78 Competency questions and SPARQL query for ‘Defined Contribution Plan’ class

CQ77: What are the total value of Defined Contribution Plan and the unit of currency used for measurement for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalValueOfDefinedContributionPlan ?object } csr:measurementUnitCurrency ?object } </pre>
SPARQL query’s answer to CQ77 (a-b) in Appendix B.

Table 8.79 Competency questions and SPARQL query for ‘Other Type Of Retirement Benefit’ class

CQ78: What are the other types of retirement benefits, the extent to which a post-retirement medical scheme is estimated, time scale to achieve full coverage by employer for the post-retirement medical scheme, and the unit of currency used for measurement by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:otherTypeOfRetirementBenefitName ?object } csr:extentToWhichPostRetirementMedicalSchemeIsEstimated ?object csr:timeScaleToAchieveFullCoverageByEmployerForPostRetirementMedicalScheme ?object } csr:measurementUnitCurrency ?object }</pre>
SPARQL query’s answer to CQ78 (a-d) in Appendix B.

Table 8.80 Competency questions and SPARQL query for ‘Pension Liability’ class

CQ79: What are the total value of pension liability and the unit of currency used for measurement for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalValueOfPensionLiability ?object } csr:measurementUnitCurrency ?object }</pre>
SPARQL query’s answer to CQ79 (a-b) in Appendix B.

Table 8.81 Competency questions and SPARQL query for ‘Liability’ class

CQ80: What is the total value of Liability and measurement unit currency for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalValueOfLiability ?object } csr:measurementUnitCurrency ?object }</pre>
SPARQL query’s answer to CQ 80 (a-b) in Appendix B.

8.3.3.1.2. Competency questions and SPARQL query for ‘Market Presence Aspect’ class

8.3.3.1.2.1. Competency questions and SPARQL query for EC6: ‘Proportion Of Senior Management Hired From Local Community At Significant Location Of Operation Indicator’ class

Table 8.82 Competency questions and SPARQL query for ‘Percentage Of Senior Management’ class

CQ81: What is the Percentage Of Senior Management at significant locations of operation that are hired from the local community for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:percentageOfSeniorManagement ?object }</pre>
SPARQL query’s answer to CQ 81 in Appendix B.

8.3.3.1.3. Competency questions and SPARQL query for ‘Indirect Economic Impact Aspect’ class

8.3.3.1.3.1. Competency questions and SPARQL query for EC7: ‘Development And Impact Of Infrastructure Investment And Service Supported Indicator’ class

Table 8.83 Competency questions and SPARQL query for ‘Infrastructure Investment and Service Supported’ class

CQ82: What is the extent of development of infrastructure investment and service supported for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:extentOfDevelopmentOfInfrastructureInvestmentandServiceSupported ?object }</pre>
SPARQL query’s answer to CQ 82 in Appendix B.

Table 8.84 Competency questions and SPARQL query for ‘Community And Local Economy’ class

CQ83: What is the name of the ‘Community and Local Economy’ for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:nameOfCommunityandLocalEconomy ?object }</pre>
SPARQL query’s answer to CQ 83 in Appendix B.

8.3.3.1.4. Competency questions and SPARQL query for ‘Procurement Practice Aspect’ class

8.3.3.1.4.1. Competency questions and SPARQL query for EC9: ‘Proportion Of Spending On Local Supplier At Significant Location Of Operation Indicator’ class

Table 8.85 Competency questions and SPARQL query for ‘Percentage Of Procurement Budget Spent On Local Supplier’ class

CQ84: What is the percentage of products and services purchased locally, and the organization’s geographic definition for local purchasing for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:percentageOfProductandServicePurchasedLocally ?object } csr:organizationGeographicDefinitionForLocalPurchase ?object }</pre>
SPARQL query’s answer to CQ 84 (a-b) in Appendix B.

Table 8.86 Competency questions and SPARQL query for ‘Location Of Operation’ class

CQ85: What is the definition used for significant location of operation for local purchase for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:definitionUsedForSignificantLocationOfOperationForLocalPurchase ?object } </pre>
SPARQL query’s answer to CQ 85 in Appendix B.

8.3.3.2. Competency questions and SPARQL query for ‘Environmental Aspect’ class

8.3.3.2.1. Competency questions and SPARQL query for ‘Material Aspect’ class

Table 8.87 Competency questions and SPARQL query for EN1: ‘Material Used’ class

CQ86: What is the definition used for significant location of operation for local purchases for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalWeightOfRawMaterialUsed ?object } csr:rawMaterialUsedSource ?object } csr:rawMaterialUsedPurchasedFromSupplier ?object } csr:measurementUnitOfMaterialUsed ?object } </pre>
SPARQL query’s answer to CQ 86 (a-d) in Appendix B.

8.3.3.2.1.1. Competency questions and SPARQL query for EN2: 'Percentage Of Material Used That Is Recycled Input Material' class

Table 8.88 Competency questions and SPARQL query for 'Recycled Input Material Used' class

CQ87: What are the total recycled input materials used, and the measurement unit of total recycled input materials used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalRecycledInputMaterialUsed ?object } csr:measurementUnitOfTotalRecycledInputMaterialUsed ?object }</pre>
SPARQL query's answer to CQ 87 (a-b) in Appendix B.

Table 8.89 Competency questions and SPARQL query for 'Percentage Of Recycled Input Material Used' class

CQ88: What is the percentage of recycled input materials used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:percentageOfRecycledInputMaterialUsed ?object }</pre>
SPARQL query's answer to CQ 88 in Appendix B.

8.3.3.2.2. Competency questions and SPARQL query for 'Energy Aspect' class

8.3.3.2.2.1. Competency questions and SPARQL query for EN3: 'Energy Consumption Within Org Indicator' class

Table 8.90 Competency questions and SPARQL query for 'Energy Consumption' class

CQ89: What is the total energy consumption, and unit of measurement for energy consumption by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalEnergyConsumption ?object } csr:measurementUnitOfEnergyConsumption ?object }</pre>
SPARQL query's answer to CQ 89 (a-b) in Appendix B.

Table 8.91 Competency questions and SPARQL query for 'Non Renewable Fuel Consumed' class

CQ90: What is the total fuel consumption from non-renewable source(s), and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalFuelConsumptionFromNonRenewableSource ?object } csr:measurementUnitOfFuelConsumptionFromNonRenewableSource ?object }</pre>
SPARQL query's answer to CQ 90 (a-b) in Appendix B.

Table 8.92 Competency questions and SPARQL query for ‘Electricity Consumption’ class

CQ91: What is the total electricity consumption, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalElectricityConsumption ?object } csr:measurementUnitOfElectricityConsumption ?object }</pre>
SPARQL query’s answer to CQ 91 (a-b) in Appendix B.

8.3.3.2.2.2. Competency questions and SPARQL query for EN6: ‘Reduction Of Energy Consumption’ class

Table 8.93 Competency questions and SPARQL query for ‘Process Redesign Initiative’ class

CQ92: What is the amount of reduction of energy consumption achieved as a result of the redesign initiative process, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:amountOfReductionOfEnergyConsumptionAchievedAsResultOfProcessRedesign Initiative ?object } csr:measurementUnitForReductionOfEnergyConsumption ?object }</pre>
SPARQL query’s answer to CQ 92 (a-b) in Appendix B.

8.3.3.2.2.3. Competency questions and SPARQL query for EN: 7 ‘Reduction In Energy Requirement Of Product And Service Indicator’ class

Table 8.94 Competency questions and SPARQL query for ‘Reduction In Energy Requirement’ class

CQ93: What reduction in energy requirements was achieved for the product and service, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:reductionInEnergyRequirementOfSoldProductandServiceAchieved ?object } csr:measurementUnitOfReductionInEnergyRequirementOfSoldProductandService Achieved ?object }</pre>
SPARQL query’s answer to CQ 93 (a-b) in Appendix B.

Table 8.95 Competency questions and SPARQL query for ‘Sold Product’ class

CQ94: What is the definition of Sold Product?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:soldProductDefinition ?object }</pre>
SPARQL query’s answer to CQ 94 in Appendix B.

8.3.3.2.3. Competency questions and SPARQL query for ‘Water Aspect’ class

8.3.3.2.3.1. Competency questions and SPARQL query for EN8: ‘Total Water Withdrawal by Source Indicator’ class

Table 8.96 Competency questions and SPARQL query for ‘Water Withdrawal’ class

CQ95: What is the total volume of water withdrawn and the unit of measurement used?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterWithdrawn ?object } csr:measurementUnitOfWaterWithdrawn ?object }</pre>
SPARQL query’s answer to CQ 95 (a-b) in Appendix B.

Table 8.97 Competency questions and SPARQL query for ‘Water Withdrawal By Surface Water Source’ class

CQ96: What is the total volume of water withdrawn from a surface water source for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterWithdrawnFromSurfaceWaterSource ?object }</pre>
SPARQL query’s answer to CQ 96 in Appendix B.

Table 8.98 Competency questions and SPARQL query for ‘Water Withdrawal By Ground Water Source’ class

CQ97: What is the total volume of water withdrawn from a ground water source?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterWithdrawnFromGroundWaterSource ?object }</pre>
SPARQL query’s answer to CQ 97 in Appendix B.

Table 8.99 Competency questions and SPARQL query for ‘Water Withdrawal By Rainwater Collected Directly And Stored By Org Source’ class

CQ98: What is the total volume of water withdrawn by this company from the rainwater source?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterWithdrawnFromRainWaterSource ?object }</pre>
SPARQL query’s answer to CQ 98 in Appendix B.

Table 8.100 Competency questions and SPARQL query for ‘Water Withdrawal By Waste Water From Another Org Water Source’ class

CQ99: What is the total volume of water withdrawn by this company from the waste water source?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterWithdrawnFromWasteWaterSource ?object }</pre>
SPARQL query’s answer to CQ 99 in Appendix B.

Table 8.101 Competency questions and SPARQL query for ‘Water Withdrawal By Municipal Water Supply Or Other Water Utility’ class

CQ100: What is the total volume of water withdrawn by this company from a municipal water source?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterWithdrawnFromMunicipalWaterSource ?object }</pre>
SPARQL query’s answer to CQ 100 in Appendix B.

Table 8.102 Competency questions and SPARQL query for ‘Methodology Used EN8’ class

CQ101: What is the method used by this company to withdraw water from the municipal water source?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:methodologyUsedEN8 ?object }</pre>
SPARQL query’s answer to CQ 101 in Appendix B.

8.3.3.2.3.2. Competency questions and SPARQL query for EN9: ‘Water Source Significantly Affected By Withdrawal Of Water Indicator’ class

Table 8.103 Competency questions and SPARQL query for ‘Water Source Affected’ class

CQ102: For this company, to what extent were the various water sources affected by withdrawal? Note size. Is the water source in a designated protected area? Note the biodiversity value of the water source and the value of water source to the local community.
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:waterSourceAffectedByWaterWithdrawalBySize ?object } csr:isWaterSourceDesignatedAsPotectedArea ?object } csr:biodiversityValueOfWaterSource ?object } csr:valueOfWaterSourceToLocalCommunity ?object }</pre>
SPARQL query’s answer to CQ 102 (a-d) in Appendix B.

Table 8.104 Competency questions and SPARQL query for ‘Methodology Used EN9’ class

CQ103: What methodology was used to determine whether the water source was significantly affected by its withdrawal by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:methodologyUsedEN9 ?object }</pre>
SPARQL query’s answer to CQ 103 in Appendix B.

8.3.3.2.3.3. Competency questions and SPARQL query for EN10: ‘Percentage And Total Volume Of Water Recycled And Reused Indicator’ class

Table 8.105 Competency questions and SPARQL query for ‘Water Recycled And Reused’ class

CQ104: What is the total volume of recycled and reused water, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterRecycledandReused ?object } csr:measurementUnitOfWaterRecycledandReused ?object }</pre>
SPARQL query’s answer to CQ 104 (a-b) in Appendix B.

Table 8.106 Competency questions and SPARQL query for ‘Percentage Of Water Recycled and Reused’ class

CQ105: What percentage of the total amount of recycled and reused water, was withdrawn by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:recycledandReusedWaterAsPercentageOfTotalWaterWithdrawn ?object }</pre>
SPARQL query’s answer to CQ 105 in Appendix B.

Table 8.107 Competency questions and SPARQL query for ‘Methodology Used EN10’ class

CQ106: What methodology was used to determine the percentage and total volume of water recycled and used by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:methodologyUsedEN10 ?object } </pre>
SPARQL query’s answer to CQ 106 in Appendix B.

8.3.3.2.4. Competency questions and SPARQL query for ‘Biodiversity Aspect’ class

8.3.3.2.4.1. Competency questions and SPARQL query for EN11: ‘Operational Site Owned Leased Managed in Or Adjacent To Protected Area And Area Of High Biodiversity Value Outside Protected Area Indicator’ class

Table 8.108 Competency questions and SPARQL query for ‘Operational Site’ class

CQ107: What are the total sizes of the operational site and the unit of measurement used by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalSizeOfOperationalSite ?object } csr:measurementUnitOfOperationalSiteSize ?object } </pre>
SPARQL query’s answer to CQ 107(a-b) in Appendix B.

Table 8.109 Competency questions and SPARQL query for ‘Operational Site Adjacent To’ class

CQ108: What is the operational site name, location, and the protected area or high biodiversity value area or site of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:operationalSiteName ?object } csr:operationalSiteLocation ?object } csr:protectedAreaOrHighBiodiversityValueArea ?object }</pre>
SPARQL query’s answer to CQ 108 (a-c) in Appendix B.

Table 8.110 Competency questions and SPARQL query for ‘Operational Site Owned Leased Managed In’ class

CQ109: What is the size of the operational site owned, leased, or managed by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:sizeOfOperationalSiteOwnedLeasedOrManagedIn ?object }</pre>
SPARQL query’s answer to CQ 109 in Appendix B.

Table 8.111 Competency questions and SPARQL query for ‘Operational Site Area Of High Biodiversity Value Outside Protected’ class

CQ110: What is the size of the operational site disturbed and rehabilitated by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:sizeOfOperationalSiteDisturbed ?object } csr:sizeOfOperationalSiteRehabilitated ?object }</pre>
SPARQL query’s answer to CQ 110 (a-b) in Appendix B.

8.3.3.2.4.2. Competency questions and SPARQL query for EN12:
 'Description of Significant impact Of Activity Product And Service On Biodiversity In Protected Area And Area Of High Biodiversity Value Outside Protected Area Indicator' class

Table 8.112 Competency questions and SPARQL query for 'Impact On Biodiversity' class

CQ 111: What is the nature of the significant impact made by this company on biodiversity, species affected, and extent of area impacted, duration and reversibility of significant impact?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:natureOfSignificantImpactOnBiodiversity ?object } csr:specieAffectedExtentOfAreaImpactedDurationandReversibilityOfSignificantImpactOn Biodiversity ?object }</pre>
SPARQL query's answer to CQ 111 (a-b) in Appendix B.

Table 8.113 Competency questions and SPARQL query for 'Activity Product And Service' class

CQ112: What is the name of the company's activity, product or service?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:activityProductandServiceName ?object }</pre>
SPARQL query's answer to CQ112 in Appendix B.

8.3.3.2.4.3. Competency questions and SPARQL query for EN: 13 ‘Habitat Protected Or Restored Indicator’ class

Table 8.114 Competency questions and SPARQL query for ‘All Habitat Protected Area Or Restored Area’ class

CQ 113: What is the name of the protected area, size, location, unit of measurement used, and number of areas adjacent to or on land managed, as classified by continent for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:designatedProtectedAreaName ?object } csr:terrestrialDesignatedProtectedAreaBySizeandContinent ?object } csr:maritimeDesignatedProtectedAreaBySizeandContinent ?object } csr:measurementUnitOfAllHabitatProtectedAreaOrRestoredArea ?object } csr:numberOfAreaAdjacentToLandManagedForTerrestrialDesignatedProtectedAreaByContinent ?object } csr:numberOfAreaAdjacentToLandManagedForMaritimeDesignatedProtectedAreaByContinent ?object } csr:numberOfAreaOnLandManagedForTerrestrialDesignatedProtectedAreaByContinent ?object } csr:numberOfAreaOnLandManagedForMaritimeDesignatedProtectedAreaByContinent ?object } </pre>
SPARQL query’s answer to CQ113 (a-h) in Appendix B.

8.3.3.2.4.4. Competency questions and SPARQL query for EN14: ‘Total Number Of IUCN Red List Species And National Conservation List Species With Habitats In Areas Affected By Operation By Level Of Extinction Risk Indicator’ class

Table 8.115 Competency questions and SPARQL query ‘Operational Site Adjacent To’ class

CQ 114: What is the name and location of the operational site of this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:operationalSiteNameandLocation ?object } </pre>
SPARQL query’s answer to CQ 114 in Appendix B.

Table 8.116 Competency questions and SPARQL query for ‘Specie On IUCN Red List Of Threatened Specie’ class

CQ 115: What are the total numbers of species on the IUCN Red List of threatened species according to name, level of extinction risk to vulnerable species, and level of extinction risk of least concern to this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfSpecieOnIUCNRedListOfThreatenedSpecie ?object } csr:nameOfSpecieOnIUCNRedListOfThreatenedSpecie ?object } csr:levelOfExtinctionRiskVulnerable ?object } csr:levelOfExtinctionRiskLeastConcern ?object } </pre>
SPARQL query’s answer to CQ115 (a-d) in Appendix B.

Table 8.117 Competency questions and SPARQL query ‘Specie On National Conservation Or Regional Conservation List’ class

CQ 116: What is the total number and name of species on the national conservation or regional conservation list for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfSpecieOnNationalConservationOrRegionalConservationList ?object } csr:nameOfSpecieOnNationalConservationOrRegionalConservationList ?object } </pre>
SPARQL query’s answer to CQ 116 (a-b) in Appendix B.

8.3.3.2.5. Competency questions and SPARQL query for 'Emission Aspect' class

8.3.3.2.5.1. Competency questions and SPARQL query for EN15 'Direct Greenhouse Gas GHG Emission Scope1 Indicator' class

Table 8.118 Competency questions and SPARQL query for 'Gross Direct GHG Emission Scope1' class

CQ117: What are the gross direct GHG emissions Scope1 and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:grossDirectGHGEmissionScope1 ?object } csr:measurementUnitOfGreenHouseGasGHGEmissionScope1Scope2Scope3 ?object }</pre>
SPARQL query's answer to CQ117 (a-b) in Appendix B.

Table 8.119 Competency questions and SPARQL query for 'Chosen Baseline' class

CQ118: What is the financial baseline year for this year?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:financialBaselineYear ?object }</pre>
SPARQL query's answer to CQ118 in Appendix B.

Table 8.120 Competency questions and SPARQL query for 'Source of Emission Factor Used And Global Warming Potential GWP Rate or Reference To GWP Source' class

CQ119: What is the source of the emission factor used for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:referenceToGlobalWarmingPotentialGWPSource ?object }</pre>
SPARQL query's answer to CQ119 in Appendix B.

8.3.3.2.5.2. Competency questions and SPARQL query for EN: 16 ‘Energy Indirect Greenhouse Gas GHG Emission Scope2 Indicator’ class

Table 8.121 Competency questions and SPARQL query for ‘Gross Energy Indirect GHG Emission Scope2’ class

CQ120: What are the gross energy indirect GHG emissions Scope2 and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:grossEnergyIndirectGHGEmissionScope2 ?object } csr:measurementUnitOfGreenHouseGasGHGEmissionScope1Scope2Scope3 ?object }</pre>
SPARQL query’s answer to CQ120 (a-b) in Appendix B.

8.3.3.2.5.3. Competency questions and SPARQL query for EN 17: ‘Other Indirect Greenhouse Gas GHG Emissions Scope3 Indicator’ class

Table 8.122 Competency questions and SPARQL query ‘Gross Other Indirect GHG Emission Scope3’ class

CQ 121: What are the other gross indirect GHG emissions Scope 3, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:grossGHGEmissionScope3UseOfSoldProductCoalProduct ?object } csr:grossGHGEmissionScope3UseOfSoldProductPetroleumProduct ?object } csr:measurementUnitOfGreenHouseGasGHGEmissionScope1Scope2Scope3 ?object }</pre>
SPARQL query’s answer to CQ 121(a-c) in Appendix B.

8.3.3.2.5.4. Competency questions and SPARQL query for EN18:
 ‘Greenhouse Gas GHG Emission Intensity Indicator’ class

Table 8.123 Competency questions and SPARQL query for ‘Greenhouse Gas GHG Emission Intensity Ratio’ class

CQ 122: What is the greenhouse gas GHG emission intensity ratio, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:greenhouseGasGHGEmissionIntensityRatio ?object } csr:measurementUnitOfGreenhouseGasGHGEmissionIntensityRatio ?object }</pre>
SPARQL query’s answer to CQ 122(a-b) in Appendix B.

Table 8.124 Competency questions and SPARQL query for ‘Org Specific Metric For GHG Emission Intensity Ratio’ class

CQ 123: What is the specific metric for GHG emission intensity ratio for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:productEmissionIntensity ?object }</pre>
SPARQL query’s answer to CQ 123 in Appendix B.

8.3.3.2.5.5. Competency questions and SPARQL query for EN19: ‘Reduction Of Greenhouse Gas GHG Emission Indicator’ class

Table 8.125 Competency questions and SPARQL query for ‘Process Redesign’ class

CQ 124: What is the amount of GHG reduction achieved, and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:amountOfGHGReductionAchieved ?object } csr:measurementUnitOfAmountOfGHGReductionAchieved ?object }</pre>
SPARQL query’s answer to CQ 124(a-b) in Appendix B.

Table 8.126 Competency questions and SPARQL query for ‘Chosen Base Year’ class

CQ 125: What is the financial base year for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:financialBaseYear ?object }</pre>
SPARQL query’s answer to CQ 125 in Appendix B.

8.3.3.2.5.6. Competency questions and SPARQL query for EN20: ‘Emission Of Ozone Depleting Substance ODS Indicator’ class

Table 8.127 Competency questions and SPARQL query for ‘Substance’ class

CQ 126: What is the total emission of ozone depleting substance, and the unit of measurement used for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalEmissionOfOzoneDepletingSubstance ?object } csr:measurementUnitOfEmissionOfOzoneDepletingSubstanceODS ?object }</pre>
SPARQL query’s answer to CQ 126 (a-b) in Appendix B.

8.3.3.2.5.7. Competency questions and SPARQL query for EN 21:
 ‘Significant Air Pollutant And Source Of Significant Air Emission
 Release To Environment’ class

**Table 8.128 Competency questions and SPARQL query for ‘NO₂ Air Emission’ class,
 ‘SO₂ Air Emission’ class and ‘Other Standard Category Of Air Emission Identified In
 Relevant Regulation’ class**

CQ127: What are the amounts of NO₂, SO₂, and other significant emissions and the unit of measurement used by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:amountOfNO2AirEmission ?object } csr:amountOfSO2AirEmission ?object } csr:amountOfOtherAirEmission ?object } csr:measurementUnitOfNO2SO2andOtherSignificantEmission ?object } </pre>
SPARQL query’s answer to CQ127 (a-d) in Appendix B.

8.3.3.2.6. Competency questions and SPARQL query for ‘Effluent and Waste Aspect’ class

8.3.3.2.6.1. Competency questions and SPARQL query for EN22: ‘Total Water Discharge By Quality And Destination Indicator’ class

Table 8.129 Competency questions and SPARQL query for ‘Water Discharge’ class

CQ128: What is the total volume of water discharged the total volume of water discharged by destination to offsite municipal treatment plant, to ground water, to ocean, to surface water wetland river lake, to other, and the unit of measurement used by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfWaterDischarge ?object } csr:totalVolumeOfWaterDischargeByDestinationToOffsiteMunicipalTreatmentPlant ?object } csr:totalVolumeOfWaterDischargeByDestinationToGroundWater ?object } csr:totalVolumeOfWaterDischargeByDestinationToOcean ?object } csr:totalVolumeOfWaterDischargeByDestinationToSurfaceWaterWetlandRiverLake ?object } csr:totalVolumeOfWaterDischargeByDestinationToOther ?object } csr:measurementUnitOfWaterDischarge ?object } </pre>
SPARQL query’s answer to CQ128 (a-g) in Appendix B.

8.3.3.2.6.2. Competency questions and SPARQL query for EN23: ‘Total Weight Of Waste By Type And Disposal Method Indicator’ class

Table 8.130 Competency questions and SPARQL query for ‘Waste Type’ class, ‘Hazardous Waste’ class, and ‘Non Hazardous Waste’ class

CQ129: What is the total weight of: hazardous waste-mineral, non-hazardous waste-mineral-tailing and the unit of measurement used by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalWeightOfHazardousWasteMineral ?object } csr:totalWeightOfNonHazardousWasteMineralTailing ?object } csr:measurementUnitOfWasteType ?object } </pre>
SPARQL query’s answer to CQ129 (a-c) in Appendix B.

Table 8.131 Competency questions and SPARQL query for ‘Waste Disposal Recycling Method’ class and ‘Waste Disposal On Site Storage Method’ class

CQ130: What is the total weight of: waste disposal recycling method, waste disposal on site storage method and the unit of measurement used by this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalWeightOfWasteDisposalRecyclingMethod ?object } csr:totalWeightOfWasteDisposalOnSiteStorageMethod ?object } csr:measurementUnitOfWasteDisposalMethod ?object } </pre>
SPARQL query’s answer to CQ130 (a-c) in Appendix B.

8.3.3.2.6.3. Competency questions and SPARQL query for EN24: ‘Total Number And Volume Of Significant Spill Indicator’ class

Table 8.132 Competency questions and SPARQL query for ‘Significant Spill’ class

CQ131: What is the total volume of significant spills and the unit of measurement used to record them for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalVolumeOfSignificantSpill ?object } csr:measurementUnitOfSignificantSpill ?object } </pre>
SPARQL query’s answer to CQ131 (a-b) in Appendix B.

Table 8.133 Competency questions and SPARQL query for ‘Recorded Significant Spill’ class

CQ132: What are the volume, measurement unit, location, material, and impact of Recorded Significant Spill for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:volumeOfRecordedSignificantSpill ?object } csr:measurementUnitOfRecordedSignificantSpill ?object } csr:materialOfRecordedSignificantSpill ?object } csr:impactOfRecordedSignificantSpill ?object } </pre>
SPARQL query’s answer to CQ132 (a-d) in Appendix B.

8.3.3.2.7. Competency questions and SPARQL query for ‘Product And Services Aspect’ class

8.3.3.2.7.1. Competency questions and SPARQL query for EN27: ‘Extent Of Impact Mitigation Of Environmental Impact Of Product And Service Indicator’ class

Table 8.134 Competency questions and SPARQL query for ‘Specific Initiative Undertaken To Mitigate Most Significant Environmental Impact Of Product and Service Group’ class

CQ 133: What is the specific initiative undertaken to mitigate the most significant environmental impact of product and service group class for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:specificInitiativeUndertaken ?object } </pre>
SPARQL query’s answer to CQ 133 in Appendix B.

8.3.3.2.8. Competency questions and SPARQL query for 'Compliance Aspect' class

8.3.3.2.8.1. Competency questions and SPARQL query for EN 29: 'Monetary Value of Significant Fine And Total Number Of Non-Monetary Sanction For Non-Compliance With Environmental Law And Regulation Indicator' class

Table 8.135 Competency questions and SPARQL query for 'International Declaration Convention Treaty And National Sub National Regional And Local Regulation' class

CQ 134: What are the total number of non-monetary sanctions for failure to comply with environmental law and regulation, the total monetary value of significant fines for failure to comply with environmental law and regulation, the unit of measurement used, and the description of regional environmental fine levied for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfNonMonetarySanctionForFailureToComplyWithEnvironmentalLawand Regulation ?object } csr:totalMonetaryValueOfSignificantFineForFailureToComplyWithEnvironmentalLawand Regulation ?object } csr:measurementUnitOfSignificantFineForFailureToComplyWithEnvironmentalLawandRegulation ?object } csr:descriptionOfRegionalEnvironmentalFineLevied ?object }</pre>
SPARQL query's answer to CQ 134(a-d) in Appendix B.

8.3.3.2.9. Competency questions and SPARQL query for ‘Supplier Environmental Assessment Aspect’ class

8.3.3.2.9.1. Competency questions and SPARQL query for EN32: ‘Percentage Of New Supplier That Was Screened Using Environmental Criteria Indicator’ class

Table 8.136 Competency questions and SPARQL query for ‘Total Number Of New Supplier Contracting With Org’ class

CQ 135: What is the total number of new suppliers that were contracting with this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfNewSupplierContractingWithOrg ?object }</pre>
SPARQL query’s answer to CQ 135 in Appendix B.

8.3.3.2.10. Competency questions and SPARQL query for ‘Environmental Grievance Mechanism Aspect’ class

8.3.3.2.10.1. Competency questions and SPARQL query for EN34: ‘Number Of Grievances About Environmental Impact Filed Addressed And Resolved Through Formal Grievance Mechanism Indicator’ class

Table 8.137 Competency questions and SPARQL query for ‘Grievance About Environmental Impact Filed’ class

CQ136: What is the nature, location, parties involved, and total number of grievances filed concerning the environmental impact of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:natureLocationandPartyOfGrievanceFiledAboutEnvironmentalImpact ?object } csr:totalNumberOfGrievanceFiledAboutEnvironmentalImpact ?object }</pre>
SPARQL query’s answer to CQ136 (a-b) in Appendix B.

Table 8.138 Competency questions and SPARQL query for ‘Grievance About Environmental Impact Addressed’ class

CQ137: What is the total number of grievances addressed in regard to environmental impact for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceAddressedAboutEnvironmentalImpact ?object } </pre>
SPARQL query’s answer to CQ137 in Appendix B.

Table 8.139 Competency questions and SPARQL query for ‘Grievance About Environmental Impact Resolved’ class

CQ138: What is the total number of grievances resolved concerning the environmental impact of this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceResolvedAboutEnvironmentalImpact ?object } </pre>
SPARQL query’s answer to CQ138 in Appendix B.

8.3.3.3. Competency questions and SPARQL query for ‘Labor Practice And Decent Work Aspect’ class

8.3.3.3.1. Competency questions and SPARQL query for ‘Employment Aspect’ class

8.3.3.3.1.1. Competency questions and SPARQL query for LA1: ‘Total Number And Rate Of New Employee Hire And Employee Turnover By Age Group Gender And Region Indicator’ class

8.3.3.3.1.1.1. Competency questions and SPARQL query for ‘New Employee Hire’ class

Table 8.140 Competency questions and SPARQL query for ‘New Employee Hire By Age Group’ class

CQ139: What is the total number and rate of new employees hired, the total number and rate of new employees hired by age group under 30-year-old, the total number and rate of new employees hired by age group 30 to 50-year-old, and the total number and rate of new employees hired by age group over 50 years old for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberandRateOfNewEmployeeHire ?object } csr:totalNumberandRateOfNewEmployeeHireByAgeGroupUnder30YearOld ?object } csr:totalNumberandRateOfNewEmployeeHireByAgeGroup30To50YearOld ?object } csr:totalNumberandRateOfNewEmployeeHireByAgeGroupOver50YearOld ?object }</pre>
SPARQL query’s answer to CQ139 (a-d) in Appendix B.

Table 8.141 Competency questions and SPARQL query for ‘New Employee Hire By Gender’ class

CQ 140: What is the total number and rate of new employees hired according to gender for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberandRateOfNewEmployeeHireByFemale ?object } csr:totalNumberandRateOfNewEmployeeHireByMale ?object }</pre>
SPARQL query’s answer to CQ 140 (a-b) in Appendix B.

Table 8.142 Competency questions and SPARQL query for ‘New Employee Hire By Region’ class

CQ 141: What are the name of region, total numbers and rate of new employees hired by this company according to region?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:nameOfRegionForTotalNumberandRateOfNewEmployeeHire ?object } csr:totalNumberandRateOfNewEmployeeHireByRegion ?object } </pre>
SPARQL query’s answer to CQ 141 (a-b) in Appendix B.

8.3.3.3.1.1.2. Competency questions and SPARQL query for ‘Employee Turnover’ class

Table 8.143 Competency questions and SPARQL query for ‘Employee Turnover By Age Group’ class

CQ142: What is the total number and rate of employee turnover, the total number and rate of employee turnover by age group under 30 years old, the total number and rate of employee turnover by age group 30 to 50 years old, and the total number and rate of employee turnover by age group over 50 years old for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberandRateOfEmployeeTurnover ?object } csr:totalNumberandRateOfEmployeeTurnoverByAgeGroupUnder30YearOld ?object } csr:totalNumberandRateOfEmployeeTurnoverByAgeGroup30To50YearOld ?object } csr:totalNumberandRateOfEmployeeTurnoverByAgeGroupOver50YearOld ?object } </pre>
SPARQL query’s answer to CQ142 (a-d) in Appendix B.

Table 8.144 Competency questions and SPARQL query for ‘Employee Turnover By Gender’ class

CQ143: What is the total number and rate of employee turnover by gender for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberandRateOfEmployeeTurnoverByFemale ? object } csr:totalNumberandRateOfEmployeeTurnoverByMale ? object } </pre>
SPARQL query’s answer to CQ143 (a-b) in Appendix B.

Table 8.145 Competency questions and SPARQL query for ‘Employee Turnover By Region’ class

CQ 144: What is the name of region, total number and rate of employee turnover by region for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:nameOfRegionForTotalNumberandRateOfEmployeeTurnover ? object } csr:totalNumberandRateOfEmployeeTurnoverByRegion ? object } </pre>
SPARQL query’s answer to CQ 144(a-b) in Appendix B.

8.3.3.3.1.2. Competency questions and SPARQL query for LA2: ‘Benefit Provided To Full Time Employee That Is Not Provided To Temporary Or Part Time Employee By Significant Location Of Operation Indicator’ class

Table 8.146 Competency questions and SPARQL query for ‘Standard Benefit To Full Time Employee’ class

CQ145: What are the standard benefits provided to full-time employees that are not provided to temporary or part-time employees of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:standardBenefitToFullTimeEmployee ?object }</pre>
SPARQL query’s answer to CQ145 in Appendix B.

8.3.3.3.1.3. Competency questions and SPARQL query for LA3: ‘Return To Work And Retention Rate After Parental Leave By Gender Indicator’ class

Table 8.147 Competency questions and SPARQL query for ‘Employee Entitled To Parental Leave’ class

CQ146: What is the total number of employees who were entitled to parental leave, by gender for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfEmployeeEntitledToParentalLeave ?object } csr:totalNumberOfEmployeeEntitledToParentalLeaveByGender ?object }</pre>
SPARQL query’s answer to CQ146 (a-b) in Appendix B.

Table 8.148 Competency questions and SPARQL query for ‘Employee Taken Parental Leave’ class

CQ147: What is the total number of employees who took parental leave from this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfEmployeeTakenParentalLeave ?object } csr:totalNumberOfEmployeeTakenParentalLeaveByGenger ?object } </pre>
SPARQL query’s answer to CQ147 (a-b) in Appendix B.

Table 8.149 Competency questions and SPARQL query for ‘Employee Returned To Work After Parental Leave Ended’ class

CQ148: What is the total number of employees of this company who returned to work after parental leave ended?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEnded ?object } csr:totalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedByGender ?object } </pre>
SPARQL query’s answer to CQ148 (a-b) in Appendix B.

Table 8.150 Competency questions and SPARQL query for ‘Employee Returned To Work After Parental Leave Ended Who Still Employed Twelve Month After Return To Work’ class

CQ149: What is the total number of employees who returned to work for this company after parental leave ended and who were still employed twelve months after their return to work, according to gender?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveM onthAfterReturnToWork ?object } csr:totalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveM onthAfterReturnToWorkByGender ?object } </pre>
SPARQL query’s answer to CQ149 (a-b) in Appendix B.

Table 8.151 Competency questions and SPARQL query for ‘Return To Work Rate Of Employee Who Took Parental Leave’ class

CQ 150: What is the return rate of employees of this company who took parental leave, according to gender?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:returnRateOfEmployeeWhoTookParentalLeaveByGender ?object } </pre>
SPARQL query’s answer to CQ150 in Appendix B.

Table 8.152 Competency questions and SPARQL query for ‘Retention Rate Of Employee Who Took Parental Leave’ class

CQ 151: What is the retention rate of employees who took parental leave, according to gender?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:retentionRateOfEmployeeWhoTookParentalLeaveByGender ?object } </pre>
SPARQL query’s answer to CQ 151 in Appendix B.

8.3.3.3.2. Competency questions and SPARQL query for ‘Labor Management Relation Aspect’ class

8.3.3.3.2.1. Competency questions and SPARQL query for LA4: ‘Minimum Notice Period Regarding Operation Change Including Whether Specified In Collective Agreement Indicator’ class

Table 8.153 Competency questions and SPARQL query for ‘Significant Operation Change’ class

CQ152: What is the minimum number of weeks’ notice typically provided to employees of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:minimumNumberOfWeekNoticeTypicallyProvidedToEmployee ?object }</pre>
SPARQL query’s answer to CQ152 in Appendix B.

Table 8.154 Competency questions and SPARQL query for ‘Collective Bargaining Agreement’ class

CQ153: Is a notice period and provision for consultation and negotiation specified in a collective Agreement pertaining to this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:isNoticePeriodandProvisionForConsultationandNegotiationSpecifiedInCollectiveAgreement ?object }</pre>
SPARQL query’s answer to CQ153 in Appendix B.

8.3.3.3.3. Competency questions and SPARQL query for ‘Occupational Health And Safety Aspect’ class

8.3.3.3.3.1. Competency questions and SPARQL query for LA5 ‘Percentage Of Total Workforce Represented In Formal Joint Management Worker Health And Safety Committee That Help Monitor And Advise On Occupational Health And Safety Program Indicator’ class

Table 8.155 Competency questions and SPARQL query for ‘Workforce Represented In Formal Joint Management Worker Health And Safety Committee’ class

CQ154: At what level does a formal joint management worker health and safety committee typically operate within the company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:levelAtWhichFormalJointManagementWorkerHealthandSafetyCommitteeTypicallyOperateWithin Org ?object }</pre>
SPARQL query’s answer to CQ154 in Appendix B.

8.3.3.3.3.2. Competency questions and SPARQL query for LA6: ‘Type Of Injury Rate Of Injury Occupational Disease Lost Day And Absenteeism And Total Number Of Work Related Fatality By Region And By Gender Indicator’ class

Table 8.156 Competency questions and SPARQL query for ‘Type of Injury For Total Workforce’ class

CQ155: What types of injuries are experienced by employees of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:typeOfInjuryForEmployee ?object }</pre>
SPARQL query’s answer to CQ155 in Appendix B.

Table 8.157 Competency questions and SPARQL query for ‘Injury Rate For Total Workforce’ class

CQ156: In terms of region, what is the injury rate for employees of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:injuryRateForTotalEmployee ?object } csr:regionNameForEmployeeInjuryRate ?object } csr:injuryRateForEmployeeByRegion ?object }</pre>
SPARQL query’s answer to CQ156 (a-c) in Appendix B.

Table 8.158 Competency questions and SPARQL query for ‘Occupational Disease Rate For Total Workforce’ class

CQ157: What is the occupational disease rate of employees of this company according to region?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:occupationalDiseaseRateForTotalEmployee ?object } csr:regionNameForEmployeeOccupationalDiseaseRate ?object } csr:occupationalDiseaseRateForEmployeeByRegion ?object }</pre>
SPARQL query’s answer to CQ157 (a-c) in Appendix B.

Table 8.159 Competency questions and SPARQL query for ‘Lost Day Rate For Total Workforce’ class

CQ158: What is the lost days rate for employees of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:lostDayRateForEmployee ?object }</pre>
SPARQL query’s answer to CQ158 in Appendix B.

Table 8.160 Competency questions and SPARQL query for ‘Absentee Rate For Total Workforce’ class

CQ159: What is the absentee rate of employees of this company in terms of region?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:absenteeRateForTotalEmployee ?object } csr:regionNameForEmployeeAbsenteeRate ?object } csr:absenteeRateForEmployeeByRegion ?object } </pre>
SPARQL query’s answer to CQ159 (a-c) in Appendix B.

Table 8.161 Competency questions and SPARQL query for ‘Work Related Fatality For Total Workforce’ class

CQ160: What is the annual number of fatalities for employees of this company in terms of region?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:absoluteNumberOfFatalityForTotalEmployee ?object } csr:regionNameForEmployeeAbsoluteNumberOfFatality ?object } csr:absoluteNumberOfFatalityForEmployeeByRegion ?object } </pre>
SPARQL query’s answer to CQ160 (a-c) in Appendix B.

Table 8.162 Competency questions and SPARQL query for ‘Occupational Disease Rate For Independent Contractor’ class

CQ161: What is the occupation-related disease rate for all contractors to this company, by region?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:occupationalDiseaseRateForTotalContractor ?object } csr:regionNameForContractorOccupationalDiseaseRate ?object } csr:occupationalDiseaseRateForContractorByRegion ?object } </pre>
SPARQL query’s answer to CQ161 (a-c) in Appendix B.

8.3.3.3.3. Competency questions and SPARQL query for LA8 'Health and Safety Topic Covered in Formal Agreement With Trade Union Indicator' class

Table 8.163 Competency questions and SPARQL query for 'Formal Agreement With Trade Union' class

CQ162: Does the company have a local or global agreement with a trade union and what is the nature of the agreement?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:whetherOrgHasLocalOrGlobalAgreementWithTradeUnion ?object } csr:typeOfFormalAgreement ?object }</pre>
SPARQL query's answer to CQ162 (a-b) in Appendix B.

8.3.3.3.4. Competency questions and SPARQL query for 'Training And Education Aspect' class

8.3.3.3.4.1. Competency questions and SPARQL query for LA9 'Average Hour Of Training Per Year Employee By Gender And By Employee Category Indicator' class

Table 8.164 Competency questions and SPARQL query for 'Employee Training by Gender' class

CQ163: What is the total number and average training hours provided to employees, by gender, for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfTrainingHourProvidedToEmployee ?object } csr:totalNumberOfTrainingHourProvidedToEmployeeByGender ?object } csr:averageTrainingHourPerEmployee ?object } csr:averageTrainingHourByGender ?object }</pre>
SPARQL query's answer to CQ163 (a-d) in Appendix B.

Table 8.165 Competency questions and SPARQL query for ‘Employee Training By Category’ class

CQ 164: What is the total number and average training hours provided to employees by category name, for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:categoryNameForEmployeeTraining ?object } csr:totalNumberOfTrainingHourProvidedToEmployeeByCategory ?object } csr:averageTrainingHourOfEmployeeByCategory ?object } </pre>
SPARQL query’s answer to CQ164 (a-c) in Appendix B.

8.3.3.3.4.2. Competency questions and SPARQL query for LA10 ‘Program For Skill Management And Lifelong Learning That Support Continued Employability Of Employee And Assist Employee In Managing Career Ending Indicator’ class

Table 8.166 Competency questions and SPARQL query for ‘Employee Training Program’ class

CQ165: What is the type and scope of programs and assistance provided to upgrade employee skills?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:typeandScopeOfProgramImplementedandAssistanceProvidedToUpgradeEmployeeSkill ?object } </pre>
SPARQL query’s answer to CQ165 in Appendix B.

Table 8.167 Competency questions and SPARQL query for ‘Transition Assistance Program’ class

CQ166: What type of transition assistance program is provided to support employees of this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:transitionAssistanceProgramProvidedToSupportEmployee ?object }</pre>
SPARQL query’s answer to CQ166 in Appendix B.

8.3.3.3.4.3. Competency questions and SPARQL query for LA11 ‘Percentage Of Employee Receiving Regular Performance And Career Development Review By Gender And By Employee Category Indicator’ class

Table 8.168 Competency questions and SPARQL query for ‘Employee Who Received Regular Performance And Career Development Review By Gender’ class

CQ 167: What percentage of employees of this company receive regular performance and career development reviews, by gender?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:percentageOfEmployeeWhoReceivedRegularPerformanceandCareerDevelopmentReviewByGender ?object }</pre>
SPARQL query’s answer to CQ167 in Appendix B.

8.3.3.3.5. Competency questions and SPARQL query for ‘Diversity And Equal Opportunity Aspect’ class

8.3.3.3.5.1. Competency questions and SPARQL query for LA12 ‘Composition Of Governance Body And Breakdown Of Employee Per Employee Category According To Gender Age Group Minority Group Membership And Other Indicator Of Diversity Indicator’ class

Table 8.169 Competency questions and SPARQL query for ‘Individual Within Governance Body’ class

CQ168: What is the total number of individuals within the governance body, by gender for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfIndividualWithinGovernanceBodyByGender ?object}</pre>
SPARQL query’s answer to CQ168 in Appendix B.

Table 8.170 Competency questions and SPARQL query for ‘Individual Within Governance Body By Gender’ class

CQ169: What is the percentage of individuals within the governance body of this company, by gender?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:percentageOfIndividualWithinGovernanceBodyByGender ?object}</pre>
SPARQL query’s answer to CQ169 in Appendix B.

Table 8.171 Competency questions and SPARQL query for ‘Individual Within Governance Body By Age Group’ class

CQ170: What is the total number and the percentage of individuals within the governance body by age group and gender for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberandPercentageOfIndividualWithinGovernanceBodyByAgeGroup30To50YearOldand Gender ?object} csr:totalNumberandPercentageOfIndividualWithinGovernanceBodyByAgeGroupOver50YearOldand Gender ?object} </pre>
SPARQL query’s answer to CQ170 (a-b) in Appendix B.

Table 8.172 Competency questions and SPARQL query for ‘Employee Category’ class

CQ171: What is the employee category name for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:employeeCategoryNameLA12 ?object} </pre>
SPARQL query’s answer to CQ171 in Appendix B.

Table 8.173 Competency questions and SPARQL query for ‘Employee Category By Gender’ class

CQ172: What is the total number of and percentage of employees of this company per employee category by gender?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberandPercentageOfEmployeeCategoryByGender ?object} </pre>
SPARQL query’s answer to CQ172 in Appendix B.

Table 8.174 Competency questions and SPARQL query for ‘Employee Category By Age Group Under 30 Year Old’ class

CQ 173: What are the percentages of employees of this company per employee category by age group: under 30 years old?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:percentageOfEmployeePerEmployeeCategoryByAgeGroupUnder30YearOld ?object} </pre>
SPARQL query’s answer to CQ173 in Appendix B.

Table 8.175 Competency questions and SPARQL query for ‘Employee Category By Age Group 30 To50 Year Old’ class

CQ 174: What are the percentages of employees of this company per employee category by age group: 30-50 years old?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:percentageOfEmployeePerEmployeeCategoryByAgeGroup30To50YearOld ?object} </pre>
SPARQL query’s answer to CQ174 in Appendix B.

Table 8.176 Competency questions and SPARQL query for ‘Employee Category By Age Group Over50 Year Old’ class

CQ 175: What are the percentages of employees of this company per employee category by age group: over 50 years old?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:percentageOfEmployeePerEmployeeCategoryByAgeGroupOver50YearOld ?object} </pre>
SPARQL query’s answer to CQ175 in Appendix B.

8.3.3.3.6. Competency questions and SPARQL query for 'Equal Remuneration For Woman to Man Aspect' class

8.3.3.3.6.1. Competency questions and SPARQL query for LA13:'Ratio Of Basic Salary And Remuneration Of Woman To Man By Employee Category By Significant Location Of Operation Indicator' class

Table 8.177 Competency questions and SPARQL query for 'Employee Category' class

CQ 176: What is the employee category name for LA13 for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:employeeCategoryNameLA13 ?object}</pre>
SPARQL query's answer to CQ176 in Appendix B.

Table 8.178 Competency questions and SPARQL query 'Ratio Of Basic Salary Male To Female Per Employee Category' class

CQ 177: What is the ratio of the basic salary for males and females for each employee category and the unit of measurement used by this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:ratioOfBasicSalaryMaleToFemaleForEmployeeCategory ?object} csr:measurementUnitForRatioOfBasicSalaryMaleToFemaleForEmployeeCategory ?object}</pre>
SPARQL query's answer to CQ177 (a-b) in Appendix B.

8.3.3.3.7. Competency questions and SPARQL query for ‘Labor Practice Grievance Mechanism Aspect’ class

8.3.3.3.7.1. Competency questions and SPARQL query for LA16: ‘Number Of Grievance About Labor Practice Filed Addressed And Resolved Through Formal Grievance Mechanism’ class

Table 8.179 Competency questions and SPARQL query for ‘Grievance Labor Practice Filed’ class

CQ 178: What is the total number of grievances filed concerning labor practices in this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceLaborPracticeFiled ?object }</pre>
SPARQL query’s answer to CQ178 in Appendix B.

Table 8.180 Competency questions and SPARQL query for ‘Grievance Labor Practice Addressed’ class

CQ 179: What is the total number of grievances addressed concerning labor practices in this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceLaborPracticeAddressed ?object }</pre>
SPARQL query’s answer to CQ179 in Appendix B.

Table 8.181 Competency questions and SPARQL query for ‘Grievance Labor Practice Resolved’ class

CQ 180: What is the total number of resolved grievances concerning labor practices in this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceLaborPracticeResolved ?object } </pre>
SPARQL query’s answer to CQ180 in Appendix B.

8.3.3.4. Competency questions and SPARQL query for ‘Human Right Aspect’ class

8.3.3.4.1. Competency questions and SPARQL query for ‘Investment Aspect’ class

Table 8.182 Competency questions and SPARQL query for HR2:‘Training On Human Right Policy Or Procedure Concerning Aspect Of Human Right That Is Relevant To Operation’ class

CQ 181: What is the total number of hours devoted to training on human rights policies and procedures that are relevant to the company’s operations, and the total number and percentage of employees training in human rights policy matters or procedures concerning aspects of human rights relevant to the company’s operations?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfHourDevotedToTrainingOnHumanRightPolicyOrProcedureRelevantToOperation ?object} csr:totalNumberOfEmployeeWhoReceivedTrainingOnHumanRightPolicyOrProcedureRelevantToOperation ?object} csr:percentageOfEmployeeTrainingInHumanRightPolicyOrProcedureConcerningAspectOfHumanRightThatIsRelevantToOperation ?object} </pre>
SPARQL query’s answer to CQ181 (a-c) in Appendix B.

8.3.3.4.2. Competency questions and SPARQL query for ‘Non Discrimination Aspect’ class

8.3.3.4.2.1. Competency questions and SPARQL query for HR3: ‘Total Number Of Incident Of Discrimination And Corrective Action Taken Indicator’ class

Table 8.183 Competency questions and SPARQL query for ‘Incident Of Discrimination On Ground Of Other Relevant Form Of Discrimination’ class

CQ 182: What is the total number of incidents of discrimination in this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfIncidentOfDiscrimination ?object}</pre>
SPARQL query’s answer to CQ182 in Appendix B.

Table 8.184 Competency questions and SPARQL query for ‘Status Of Incident Of Discrimination’ class

CQ 183: What is the incidence of discrimination events reviewed by the company, the remediation plans implemented, results reviewed, and incidents longer subject to action?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:incidentReviewedByOrg ?object} csr:remediationPlanHasBeenImplementedandResultReviewed ?object}</pre>
SPARQL query’s answer to CQ183 (a-b) in Appendix B.

Table 8.185 Competency questions and SPARQL query for ‘Action Taken Against Incident Of Discrimination’ class

CQ 184: What is the action was taken in regard to the incident of discrimination for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:incidentNoLongerSubjectToAction ?object}</pre>
SPARQL query’s answer to CQ184 in Appendix B.

8.3.3.4.3. Competency questions and SPARQL query for ‘Security Practice Aspect’ class

Table 8.186 Competency questions and SPARQL query for HR7:‘Percentage Of Security Personnel Trained In Org Human Right Policy Or Procedure That Is Relevant To Operation Indicator’ class

CQ 185: What is the total number of security personnel who received formal training on human rights policies or procedures?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfSecurityPersonnel ?object} csr:totalNumberOfSecurityPersonnelReceivedFormalTrainingOnHumanRightPolicyOrProcedure ?object} csr:percentageOfSecurityPersonnelReceivedFormalTrainingOnHumanRightPolicyOr Procedure ?object}</pre>
SPARQL query’s answer to CQ185 (a-c) in Appendix B.

8.3.3.4.4. Competency questions and SPARQL query for 'Indigenous Right Aspect' class

8.3.3.4.4.1. Competency questions and SPARQL query for HR8: 'Total Number Of Incident Of Violation Involving Right Of Indigenous People And Action Taken Indicator' class

Table 8.187 Competency questions and SPARQL query for 'Incident Involving Right Of Indigenous People' class

CQ186: What is the total number of incidents concerning violation of human rights in regard to indigenous people?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfIncidentOfViolationInvolvingRightOfIndigenousPeople ?object}</pre>
SPARQL query's answer to CQ186 in Appendix B.

Table 8.188 Competency questions and SPARQL query for 'Status Of Incident Of Violation' class

CQ187: What types of incidents of violation involving the rights of indigenous people were reviewed by the company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:incidentOfViolationInvolvingRightOfIndigenousPeopleReviewdByOrg ?object}</pre>
SPARQL query's answer to CQ187 in Appendix B.

8.3.3.5. Competency questions and SPARQL query for ‘Society Aspect’ class

8.3.3.5.1. Competency questions and SPARQL query for ‘Local Community Aspect’ class

8.3.3.5.1.1. Competency questions and SPARQL query for SO1: ‘Percentage Of Operation With Implemented Local Community Engagement Impact Assessment And Development Program Indicator’ class

Table 8.189 Competency questions and SPARQL query for ‘Organization Wide’ class

CQ 188: What operations, by type and number, have the company undertaken?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:nameOfOperationThatHasUndertakenOrganizationWide ?object} csr:totalNumberOfOperationThatHasUndertakenOrganizationWide ?object} </pre>
SPARQL query’s answer to CQ188 (a-b) in Appendix B.

Table 8.190 Competency questions and SPARQL query for ‘Operation With Implemented Local Community Engagement’ class

CQ 189: What are the total number and the percentage of operations that have been undertaken organization-wide and implemented by this company with local community engagement?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfOperationThatHasUndertakenOrganizationWideLocalCommunity Engagement ?object} csr:percentageOfOperationWithImplementedLocalCommunityEngagement ?object} </pre>
SPARQL query’s answer to CQ189 (a-b) in Appendix B.

Table 8.191 Competency questions and SPARQL query for ‘Operation With Implemented Impact Assessment’ class

CQ 190: What are the total number and the percentage of operations, organization wide, that have undergone impact assessment?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfOperationThatHasUndertakenOrganizationWideImpactAssessment ?object } csr:percentageOfOperationWithImplementedImpactAssessment ?object } </pre>
SPARQL query’s answer to CQ190 (a-b) in Appendix B.

Table 8.192 Competency questions and SPARQL query for ‘Operation With Implemented Development Program’ class

CQ 191: What are the total number and the percentage of operations that have undertaken organization wide with an implemented development program for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfOperationThatHasUndertakenOrganizationWideDevelopmentProgram ?object} csr:percentageOfOperationWithImplementedDevelopmentProgram ?object} </pre>
SPARQL query’s answer to CQ191 (a-b) in Appendix B.

Table 8.193 Competency questions and SPARQL query for SO2: ‘Operation With Significant Actual Or Potential Negative Impact On Local Community Indicator’ class

CQ 192: From which location does this company operate? What significant actual and potential negative impacts does it have on the local community?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:locationOfOperationOnLocalCommunity ?object} csr:significantActualandPotentialNegativeImpactOfOperationOnLocalCommunity ?object} csr:sourceOfInformationAboutActualandPotentialNegativeImpactOfOperationOnLocalCommunity ?object} </pre>
SPARQL query’s answer to CQ192 (a-b) in Appendix B.

8.3.3.5.2. Competency questions and SPARQL query for ‘Public Policy Aspect’ class

Table 8.194 Competency questions and SPARQL query for SO6: ‘Total Value Of Political Contribution By Country And Recipient’ class

CQ 193: What is the total monetary value of the financial and in-kind political contribution made by the company to the country in which it is operating, the recipient or cause name, and the unit of measurement used?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalMonetaryValueOfFinancialandInKindPoliticalContribution ?object} csr:countryandRecipientNameandCause ?object} csr:measurementUnitOfFinancialandInKindPoliticalContribution ?object} </pre>
SPARQL query’s answer to CQ193 (a-c) in Appendix B.

8.3.3.5.3. Competency questions and SPARQL query for ‘Compliance Aspect’ class

8.3.3.5.3.1. Competency questions and SPARQL query for SO8: ‘Monetary Value Of Significant Fine And Total Number Of Non-Monetary Sanction For Non-Compliance With Society Law And Regulation Indicator’ class

Table 8.195 Competency questions and SPARQL query for ‘International Declaration Convention Treaty And National Sub National Regional And Local Regulation’ class

CQ 194: What is the total number of non-monetary sanctions, the total monetary value of significant fines for failure to comply with society’s laws and regulations, and the unit of measurement used for this company?
SPARQL query
<pre> SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfNonMonetarySanctionForFailureToComplyWithSocialLawandRegulation ?object} csr:totalMonetaryValueOfSignificantFineForFailureToComplyWithSocietyLawand Regulation ?object} csr:measurementUnitOfSignificantFineForFailureToComplyWithSocietyLawandRegulation ?object} </pre>
SPARQL query’s answer to CQ194 (a-c) in Appendix B.

8.3.3.5.4. Competency questions and SPARQL query for ‘Grievance Mechanism For Impact On Society Aspect’ class

8.3.3.5.4.1. Competency questions and SPARQL query for ‘SO11: ‘Number Of Grievance About Impact On Society Filed Addressed And Resolved Through Formal Grievance Mechanism’ class

Table 8.196 Competency questions and SPARQL query for ‘Grievance About Impact On Society Filed’ class

CQ 195: What is the total number of grievances filed against this company, including the nature, location, and party concerned, and impact on society?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceFiledAboutImpactOnSociety ?object} csr:natureLocationandPartyOfGrievanceFiledAboutImpactOnSociety ?object}</pre>
SPARQL query’s answer to CQ195 (a-b) in Appendix B.

Table 8.197 Competency questions and SPARQL query for ‘Grievance About Impact On Society Addressed’ class

CQ 196: What is the total number of grievances addressed concerning the impact on society for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceAddressedAboutImpactOnSociety ?object}</pre>
SPARQL query’s answer to CQ196 in Appendix B.

Table 8.198 Competency questions and SPARQL query for ‘Grievances About Impact On Society Resolved’ class

CQ 197: What is the total number of grievances resolved concerning the impact on society for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfGrievanceResolvedAboutImpactOnSociety ?object}</pre>
SPARQL query’s answer to CQ197 in Appendix B.

8.3.3.6. Competency questions and SPARQL query for ‘Product Responsibility Aspect’ class

8.3.3.6.1. Competency questions and SPARQL query for ‘Customer Health And Safety Aspect’ class

8.3.3.6.1.1. Competency questions and SPARQL query for PR2: ‘Total Number Of Incident Of Non-Compliance With Regulation And Voluntary Code Concerning Health And Safety Impact Of Product And Service During Product and Service Life Cycle By Type Of Outcome Indicator’ class

Table 8.199 Competency questions and SPARQL query for ‘Incident Of Non-Compliance With Regulation Concerning Health And Safety Impact Of Product And Service Resulting In Fine Or Penalty’ class

CQ 198: What is the total number of incidents of non-compliance with regulations concerning health and safety, impact of product, and services resulting in fines or penalties for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfIncidentOfNonComplianceWithRegulationConcerningHealthandSafetyImpactOfPr oductandServiceResultingInFineOrPenalty ?object}</pre>
SPARQL query’s answer to CQ198 in Appendix B.

8.3.3.6.2. Competency questions and SPARQL query for ‘Product And Service Labeling Aspect’ class

8.3.3.6.2.1. Competency questions and SPARQL query for PR5: ‘Result Of Survey Measuring Customer Satisfaction Indicator’ class

Table 8.200 Competency questions and SPARQL query for ‘Result Or Key Of Survey For Whole Org’ class

CQ 199: What are the results of the company’s customer satisfaction survey?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:resultOfCustomerSatisfactionSurvey ?object}</pre>
SPARQL query’s answer to CQ199 in Appendix B.

Table 8.201 Competency questions and SPARQL query for ‘Customer Satisfaction’ class

CQ 200: How was customer satisfaction measured by the company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:howCustomerSatisfactionIsMeasured ?object}</pre>
SPARQL query’s answer to CQ200 in Appendix B.

8.3.3.6.3. Competency questions and SPARQL query for ‘Marketing Communication Aspect’ class

8.3.3.6.3.1. Competency questions and SPARQL query for PR7: ‘Total Number Of Incident Of Non-Compliance With Regulation And Voluntary Code Concerning Marketing Communication Including Advertising Promotion And Sponsorship By Type Of Outcome Indicator’ class

Table 8.202 Competency questions and SPARQL query for ‘Incident Of Non-Compliance With Voluntary Code Concerning Marketing Communication’ class

CQ201: What is the total number of incidents of non-compliance with the voluntary code concerning marketing communication for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfIncidentOfNonComplianceWithVoluntaryCodeConcerningMarketingCommunication ?object }</pre>
SPARQL query’s answer to CQ201 in Appendix B.

8.3.3.6.4. Competency questions and SPARQL query for ‘Customer Privacy Aspect’ class

8.3.3.6.4.1. Competency questions and SPARQL query for PR8: ‘Total Number Of Substantiated Complaint Regarding Breach Of Customer Privacy And Loss Of Customer Data Indicator’ class

Table 8.203 Competency questions and SPARQL query for: ‘Complaint Regarding Breach Of Customer Privacy’ class

CQ202: What is the total number of substantiated complaints received by this company concerning breaches of customer privacy?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfSubstantiatedComplaintReceivedConcerningBreachOfCustomerPrivacy?object }</pre>
SPARQL query’s answer to CQ202 in Appendix B.

Table 8.204 Competency questions and SPARQL query for ‘Complaints Received From Outside Party’ class

CQ 203: How many complaints have been received from outside parties and substantiated by the company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:howManyComplaintReceivedFromOutsidePartyandSubstantiatedByCompany ?object}</pre>
SPARQL query’s answer to CQ203 in Appendix B.

8.3.3.6.4.1.2 Competency questions and SPARQL query for ‘Customer Data’ class

Table 8.205 Competency questions and SPARQL query for ‘Leak Of Customer Data’ class

CQ 204: What is the total number of identified leaks of customer data for this company?
SPARQL query
<pre>SELECT ?subject ?object WHERE { ?subject csr:totalNumberOfIdentifiedLeakOfCustomerData ?object}</pre>
SPARQL query’s answer to CQ204 in Appendix B.

8.4. Ontology evaluation

Weller (2010) considered the evaluation of ontology as an additional process. It incorporates verification and validation. It refers to “judging the quality of the content of the ontology” (Weller 2010; Gómez-Pérez 2001). To evaluate the ontology, there are many approaches based on the level of evaluation (Brank, Grobelnik and Mladeníć 2005) and relevant criteria identified (Gómez-Pérez 2001). It is performed differently depending on the methodologies used to build ontology (Gómez-Pérez 2001).

(Grüninger and Fox 1995) propose to evaluate ontology by identifying a set of competency questions. These questions need to be formalized in a query language to encode the competency questions using an appropriate tool (Vrandečić 2010). The form of questions is used in this evaluation.

Ontology evaluation includes technical evaluation. The core of technical evaluation is the evaluation of the definitions that consider different aspects of ontology in terms of vocabulary, structure, content, syntax, semantic and representation that satisfy the criteria of completeness, consistency, and conciseness of definitions (Vrandečić 2010; Gómez-Pérez 2001). To assess specific features of ontology, technical evaluation methods are required.

8.4.1. Ontology verification

Verification is the process whereby the correctness of ontology is ascertained. The process involves the creation of an ontology whose definitions adequately meet its requirements and competency questions, and function correctly in the real world (Gómez-Pérez 2004, 2001, 1996, 1995). Ontology verification is quite distinct from ontology validation. Ontology verification ensures that the ontology was created correctly, whereas ontology validation determines whether the right ontology was created (Vrandečić 2010). It deals with the problem of the three Cs: (consistency, completeness, and conciseness) (Gómez-Pérez 2004, 1996, 1995). Gómez-Pérez (2004) defines the three Cs as follows :

- Consistency refers to definitions in the ontology that are semantically consistent;
- Completeness refers to the extension, degree, amount of or coverage of the information about the real world in the ontology;
- Conciseness refers to the usefulness and precision of all the information gathered in the ontology.

Schema Metrics and Knowledgebase Metrics were the means used to verify the ontology for this research, (Tartir, Arpinar and Sheth 2010; Tartir et al. 2005). These metrics are presented in the following section.

8.4.1.1. Schema Metrics

This indicates the richness, width, depth, and inheritance of an ontology schema. It includes the following metrics:

1. Relationship Richness (RR): It can be computed using the following metric:

$$RR = \frac{|P|}{|SC| + |P|}$$

P: the total number of relationships defined in the schema (non-inheritance relationship or object property).

SC: the sum of the number of sub classes (the same number of inheritance relationships).

So, RR is the ratio of the number of P divided by the SC and P.

2. Attribute Richness (AR): It can be computed using the following metric:

$$AR = \frac{|att|}{|C|}$$

att: the number of attributes (data properties) per class defined in the schema.

|C|: the total number of classes defined in the schema.

So, AR, is the average number of attributes (data properties) for all classes.

3. Inheritance Richness (IR): It can be computed using the following metric:

$$IR_s = \frac{\sum_{C_i \in C} |H^c(C_1, C_i)|}{|C|}$$

This is defined as the average number of sub-classes per class.

$|H^c(C_1, C_i)|$: The number of sub-classes for a class.

Ontology with low inheritance relationships (vertical ontology) is better than ontology with high inheritance relationships (horizontal ontology) because a very detailed type of knowledge is reflected in the vertical ontology represented. In contrast, a wide range of general knowledge is reflected in the horizontal ontology represented (Tartir et al. 2005).

8.4.1.2. Knowledgebase Metrics

This refers to the richness of instance in a KB. It includes the following metrics.

1. Class Richness (CR): this can be computed using the following metric:

$$CR = \frac{|C'|}{|C|}$$

|C'|: This refers to the number of classes that have instances.

So CR is the ratio of the number of classes used in the base (C') divided by the number of classes defined in the ontology schema (C).

2. Average Population (P): It can be computed using the following metric:

$$P = \frac{|I|}{|C|}$$

|I|: This refers to the number of instances of the KB. So, P is the average distribution of instances across all classes.

The results using the Schema Metrics and Knowledgebase Metrics are presented in Tables 8.206 to 8.212, and Table 8.213 summarizes the metrics of the ‘General Standard Disclosure’ class and ‘Specific Standard Disclosure’ class.

The results depicted in these tables are discussed below.

According to Table 8.206, for the class ‘General Standard Disclosure’, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 74, 116, 14, 122, 0, and 57 respectively. Therefore, the RR is 1.00. This indicates that the relationship is rich and it based on other than inheritance relationship as can be seen the number of CS is 0. In addition, The AR is 1.57 which reveals that each class has approximately this average number of 1.57 attributes. Besides, the IR is 0 because there are no sub-classes contained. Moreover, the CR is 0.77 and this indicates that each class is 77% of classes that have instances. Finally, the average population is 1.65 which indicates that there are sufficient instances to represent the classes in particular for G4-10, G4-9, G4-1, G4-17, and G4-33.

According to Table 8.207, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes of EC Aspects are 64, 193, 59, 173, 0, and 29 respectively. Therefore, the RR is 1.00 because the number of SC is 0. Each class on average has data properties of 3.02. In addition, the CR is 0.45. Besides, each class has an average instance of 2.70 which shows the richness of instances in particular for EC1, EC2, EC9, EC3, EC7, and EC6.

According to Table 8.208 for EN Aspects, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 232, 366, 200, 111, 134, and 56 respectively. The RR is 0.60 because this Aspect has 134 inheritance classes (SC). In addition, each class has an average of 1.58 attributes. Moreover, the CR is 0.24 which indicates that 0.76 of EN classes are uninstantiated. Besides, each class has 0.48 instances on average. The indicator ontologies with high numbers of instance are EN11 (8), EN24 (6), EN1 (4), EN14 (3.5), and EN8 (2).

According to Table 8.209 for LA Aspects, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 85, 149, 96, 169, 10, and 41 respectively. The RR is 0.91. In addition, the number of attributes for each class is 1.75. The CR is 0.48 which means that half of the classes do not have instances. Finally, the average instance population is 1.99. The indicator ontologies with high numbers of instance are LA12 (27.5), LA 9 (11.5), LA13 (7.00), LA6 (3.42), and LA1 (2.63).

According to Table 8.210 for HR Aspects, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 67, 115, 89, 12, 8, and 7 respectively. The RR is 0.92. In addition, the average number of attributes per class is 1.72. The CR is 0.10 which shows that the instantiated classes are 0.90. Finally, the average instance population is 0.18 per class because there are only four indicator ontologies that have instances population: HR7 (3), HR2 (1.50), HR3 (1.33), and HR8 (0.67).

According to Table 8.211 for SO Aspects, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 56, 110, (62), 21, 0, and 10 respectively. The RR is 1.00 because there is no inheritance relationship in this Aspect class. In addition, the att per class is 1.96. Also, the non-empty per class is 0.18 which indicates that only a few classes are instantiated. Finally, the average instance population per class is 0.38 because there are only four indicator ontologies that have instances, which are SO2 (3), SO1 (2), SO11 (1.33) and SO8 (1.00).

According to Table 8.212, for PR Aspects, the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 40, 76, 49, 7, 8, and 6 respectively. The RR is 0.86. In addition, the AR is 1.90. However, CR is only 0.15. Finally, the average population per class is 0.18 because there are only three indicator ontologies that have instances, which are PR8 with 1.50 instances, PR5 with an instance of 1.00, and PR2 with an instance of 0.33.

In conclusion, according to Table 8.213, a summary of Schema Metrics and Knowledgebase Metrics for 'General Standard Disclosure' class and 'Specific Standard Disclosure' class shows that the total number of classes, data properties, object properties, instances, sub-classes, and non-empty classes are 618, 1125, 569, 615, 160, and 206 respectively. The ontologies with a richness of relationship (RR) of 1.00 are 'General Standard Disclosure', the EC Aspects, and the SO Aspects, because their contained sub-classes are 0. The RR on average is 0.78 for all classes in the ontology. In addition, for the AR metric, the EC Aspects has the highest number of data properties, and the average AR for the whole ontology is 1.85. Besides, the indicator ontology with the highest number of sub-classes is the EN Aspects (0.58) and the average number for the whole ontology is 0.26. Next, the indicator ontology with the highest number of non-empty classes is the 'General Standard Disclosure' class (0.77) and the average number for the whole ontology is 0.33. Finally, the indicator ontology with the highest number of instances is EC Aspects (2.70) and the average number for the whole ontology is 1.00.

Table 8.206 Schema Metrics and Knowledgebase Metrics for 'General Standard Disclosure' class

Definition of class	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average population (P)
Sustainability Reporting Guideline G4	14.00	0.00	4.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Strategy And Analysis	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-1	1.00	7.00	0.00	5.00	0.00	1.00	0.00	7.00	0.00	1.00	5.00
G4-2	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Organizational Profile	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-3	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-4	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-5	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-6	1.00	3.00	0.00	3.00	0.00	1.00	0.00	3.00	0.00	1.00	3.00
G4-7	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-8	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-9	1.00	6.00	0.00	6.00	0.00	1.00	0.00	6.00	0.00	1.00	6.00
G4-10	1.00	6.00	0.00	17.00	0.00	1.00	0.00	6.00	0.00	1.00	17.00
G4-11	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-12	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-13	1.00	4.00	0.00	2.00	0.00	1.00	0.00	4.00	0.00	1.00	2.00

Definition of class	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average population (P)
Commitment To External Initiative	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-14	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-15	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-16	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
Identified Material Aspect And Boundary	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-17	1.00	4.00	0.00	4.00	0.00	1.00	0.00	4.00	0.00	1.00	4.00
G4-18	1.00	3.00	0.00	2.00	0.00	1.00	0.00	3.00	0.00	1.00	2.00
G4-19	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-20	1.00	3.00	0.00	3.00	0.00	1.00	0.00	3.00	0.00	1.00	3.00
G4-21	1.00	3.00	0.00	3.00	0.00	1.00	0.00	3.00	0.00	1.00	3.00
G4-22	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-23	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
Stakeholder Engagement	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-24	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-25	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-26	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-27	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00

Definition of class	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average population (P)
Report Profile	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-28	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-29	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-30	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-31	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-32	1.00	3.00	0.00	3.00	0.00	1.00	0.00	3.00	0.00	1.00	3.00
G4-33	1.00	4.00	0.00	4.00	0.00	1.00	0.00	4.00	0.00	1.00	4.00
Governance	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Governance Structure And Composition	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-34	1.00	3.00	0.00	3.00	0.00	1.00	0.00	3.00	0.00	1.00	3.00
G4-35	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-36	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-37	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-38	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-39	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-40	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-42	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00

Definition of class	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average population (P)
G4-43	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-44	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-45	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-46	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-47	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-48	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-49	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-50	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-51	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-52	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-53	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-54	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-55	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Ethic And Integrity	0.00	0.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
G4-56	1.00	2.00	0.00	2.00	0.00	1.00	0.00	2.00	0.00	1.00	2.00
G4-57	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
G4-58	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Total	74.00	116.00	14.00	122.00	0.00	57.00	1.00	1.57	0.00	0.77	1.65

Table 8.207 Schema Metrics and Knowledgebase Metrics for EC Aspects

Indicator	Class (C)	Data property (att)	Object Propert (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average Population (P)
EC Category	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
EC Aspect	4.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Economic Performance Aspect	5.00	6.00	3.00	0.00	0.00	0.00	1.00	1.2	0.00	0.00	0.00
EC1	9.00	54.00	8.00	89.00	0.00	9.00	1.00	6.00	0.00	1.00	9.89
EC2	9.00	60.00	5.00	60.00	0.00	9.00	1.00	6.67	0.00	1.00	6.67
EC3	13.00	23.00	9.00	18.00	0.00	5.00	1.00	1.77	0.00	0.38	1.38
EC4	2.00	4.00	6.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
Market Presence Aspect	3.00	6.00	3.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
EC5	5.00	5.00	6.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
EC6	2.00	4.00	4.00	1.00	0.00	2.00	1.00	2.00	0.00	1.00	0.50
Indirect Economic Impact	4.00	10.00	3.00	0.00	0.00	0.00	1.00	2.50	0.00	0.00	0.00
EC7	2.00	5.00	3.00	2.00	0.00	2.00	1.00	2.50	0.00	1.00	1.00
EC8	1.00	2.00	2.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
Procurement Practice	3.00	11.00	2.00	0.00	0.00	0.00	1.00	3.67	0.00	0.00	0.00
EC9	1.00	3.00	3.00	3.00	0.00	2.00	1.00	3.00	0.00	2.00	3.00
Total	64.00	193.00	59.00	173.00	0.00	29.00	1.00	3.02	0.00	0.45	2.70

Table 8.208 Schema Metrics and Knowledgebase Metrics for EN Aspects

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average Population (P)
Environmental Category	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
All EN Aspects	12.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Material Aspect	3.00	6.00	3.00	0.00	0.00	0.00	1.00	2.00	2.00	0.00	0.00
EN1	1.00	4.00	5.00	4.00	0.00	1.00	1.00	4.00	4.00	1.00	4.00
EN2	2.00	4.00	3.00	3.00	0.00	2.00	1.00	2.00	2.00	1.00	1.50
Energy Aspect	7.00	7.00	3.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
N3	11.00	27.00	2.00	6.00	16.00	4.00	0.11	2.45	1.45	0.36	0.55
EN4	6.00	27.00	4.00	0.00	19.00	0.00	0.17	4.5	3.17	0.00	0.00
EN5	13.00	4.00	6.00	0.00	0.00	0.00	1.00	0.31	0.00	0.00	0.00
EN6	10.00	7.00	5.00	2.00	5.00	1.00	0.50	0.70	0.50	0.10	0.20
EN7	7.00	8.00	4.00	3.00	0.00	2.00	1.00	1.14	0.00	0.29	0.43
Water Aspect	4.00	6.00	3.00	0.00	0.00	0.00	1.00	1.50	0.00	0.00	0.00
EN8	4.00	10.00	3.00	8.00	5.00	7.00	0.38	2.50	1.25	1.75	2.00
EN9	4.00	13.00	5.00	5.00	5.00	2.00	0.50	3.25	1.25	0.50	1.25
EN10	5.00	6.00	6.00	4.00	0.00	3.00	1.00	1.20	0.00	0.60	0.80
Biodiversity Aspect	6.00	7.00	3.00	0.00	0.00	0.00	1.00	1.67	0.00	0.00	0.00
EN11	1.00	8.00	1.00	8.00	7.00	4.00	0.13	8.00	7.00	4.0	8.00

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C	RR	AR	IR	CR	Average Population (P)
EN12	2.00	10.00	4.00	3.00	0.00	2.00	1.00	5.00	0.00	1.00	1.50
EN13	4.00	8.00	3.00	8.00	0.00	1.00	1.00	2.00	0.00	0.25	2.00
EN14	2.00	7.00	6.00	7.00	2.00	3.00	0.75	3.50	1.00	1.50	3.50
Emission Aspect	9.00	10.00	3.00	0.00	0.00	0.00	1.00	1.11	0.00	0.00	0.00
EN15	9.00	10.00	7.00	4.00	4.00	3.00	0.64	1.11	0.44	0.33	0.44
EN16	4.00	8.00	7.00	2.00	0.00	1.00	1.00	2.00	0.00	0.25	0.50
EN17	6.00	9.00	8.00	3.00	18.00	1.00	0.31	1.50	3.00	0.17	0.50
EN18	3.00	4.00	8.00	3.00	4.00	2.00	0.67	1.33	1.33	0.67	1.00
EN19	9.00	7.00	7.00	3.00	5.00	2.00	0.58	0.78	0.56	0.22	0.33
EN20	18.00	6.00	9.00	2.00	16.00	1.00	0.36	0.33	0.89	0.06	0.11
EN21	4.00	12.00	4.00	4.00	7.00	3.00	0.36	3.00	1.75	0.75	1.00
Effluent And Waste Aspect	6.00	6.00	3.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
EN22	7.00	12.00	6.00	7.00	2.00	1.00	0.75	1.71	0.29	0.14	1.0.0
EN23	3.00	14.00	3.00	6.00	11.00	2.00	0.21	4.67	3.67	0.67	2.00
EN24	1.00	12.00	2.00	6.00	2.00	2.00	0.50	12.00	2.00	2.00	6.00
EN25	9.00	9.00	7.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
EN26	1.00	3.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
Product And Service Aspect	3.00	6.00	3.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (SC)	C	RR	AR	IR	CR	Average Population (P)
EN27	2.00	2.00	7.00	1.00	0.00	1.00	1.00	1.00	0.00	0.50	0.50
EN28	4.00	4.00	7.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Compliance Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
EN29	4.00	4.00	5.00	4.00	0.00	1.00	1.00	1.00	0.00	0.25	1.00
Transport Aspect	1.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
EN30	1.00	3.00	1.00	0.00	6.00	0.00	0.14	3.00	6.00	0.00	0.00
Overall Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
EN31	2.00	2.00	4.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Supplier Environmental Assessment Aspect	4.00	15.00	3.00	0.00	0.00	0.00	1.00	3.75	0.00	0.00	0.00
EN32	2.00	3.00	3.00	1.00	0.00	1.00	1.00	1.50	0.00	0.50	0.50
EN33	5.00	5.00	5.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Environmental Grievance Mechanism Aspect	3.00	8.00	3.00	0.00	0.00	0.00	1.00	2.67	0.00	0.00	0.00
EN34	3.00	5.00	5.00	4.00	0.00	3.00	1.00	1.67	0.00	1.00	1.33
Total	232.00	366.00	200.00	111.00	134.00	56.00	0.60	1.58	0.58	0.24	0.48

Table 8.209 Schema Metrics and Knowledgebase Metrics for LA Aspects

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (CS)	C'	RR	AR	IR	CR	Average Population (P)
Labor Practice And Decent Work Category	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Labor Practice And Decent Work Aspect	8.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Employment Aspect	5.00	12.00	3.00	0.00	0.00	0.00	1.00	2.40	0.00	0.00	0.00
LA1	8.00	16.00	6.00	21.00	0.00	8.00	1.00	2.00	0.00	1.00	2.63
LA2	1.00	1.00	4.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00
LA3	6.00	10.00	2.00	10.00	0.00	6.00	1.00	1.67	0.00	1.00	1.67
Labor Management Relation Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
LA4	1.00	2.00	3.00	2.00	0.00	2.00	1.00	2.00	0.00	2.00	2.00
Occupational Health And Safety Aspect	5.00	7.00	3.00	0.00	0.00	0.00	1.00	1.40	0.00	0.00	0.00
LA5	1.00	2.00	3.00	1.00	0.00	1.00	1.00	2.00	0.00	1.00	1.00
LA6	12.00	22.00	13.00	41.00	0.00	7.00	1.00	1.83	0.00	0.58	3.42
LA7	1.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
LA8	1.00	2.00	4.00	2.00	2.00	1.00	0.67	2.00	2.00	1.00	2.00
Training And Education Aspect	4.00	6.00	3.00	0.00	0.00	0.00	1.00	1.50	0.00	0.00	0.00

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (CS)	C`	RR	AR	IR	CR	Average Population (P)
LA9	2.00	7.00	6.00	23.00	0.00	2.00	1.00	3.50	0.00	1.00	11.50
LA10	2.00	2.00	2.00	2.00	0.00	2.00	1.00	1.00	0.00	0.00	1.00
LA11	2.00	2.00	5.00	1.00	0.00	1.00	1.00	1.00	0.00	0.50	0.50
Diversity And Equal Opportunity	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
LA12	2.00	12.00	4.00	55.00	8.00	6.00	0.33	6.00	4.00	3.00	27.50
Equal Remuneration For woman to man Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
LA13	1.00	3.00	4.00	7.00	0.00	1.00	1.00	3.00	0.00	1.00	7.00
Supplier Assessment For Labor Practice Aspect	4.00	6.00	3.00	0.00	0.00	0.00	1.00	1.50	0.00	0.00	0.00
LA 14	1.00	2.00	3.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
LA15	5.00	6.00	6.00	0.00	0.00	0.00	1.00	1.200	0.00	0.00	0.00
Labor Practice Grievance Mechanism Aspect	3.00	6.00	3.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
LA16	3.00	4.00	5.00	3.00	0.00	3.00	1.00	1.33	0.00	0.00	1.00
Total	85	149	96	169	10	41	0.91	1.75	0.12	0.48	1.99

Table 8.210 Schema Metrics and Knowledgebase Metrics for HR Aspects

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (CS)	C'	RR	AR	IR	CR	Average Population (P)
Human Right Category	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Human Right Aspect	10.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Investment Aspect	4.00	2.00	3.00	0.00	0.00	0.00	1.00	0.50	0.00	0.00	0.00
HR1	3.00	3.00	4.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
HR2	2.00	2.00	7.00	3.00	0.00	1.00	1.00	1.00	0.00	0.50	1.50
Non Discrimination Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
HR3	3.00	11.00	4.00	4.00	8.00	3.00	0.33	3.67	2.67	1.00	1.33
Freedom Of Association And Collective Bargaining	3.00	7.00	3.00	0.00	0.00	0.00	1.00	2.33	0.00	0.00	0.00
HR4	2.00	3.00	5.00	0.00	0.00	0.00	1.00	1.50	0.00	0.00	0.00
Child Labor Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
HR5	3.00	5.00	6.00	0.00	0.00	0.00	1.00	1.67	0.00	0.00	0.00
Forced Or Compulsory Labor Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
HR6	2.00	3.00	6.00	0.00	0.00	0.00	1.00	1.50	0.00	0.00	0.00
Security Practice Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
HR7	1.00	4.00	3.00	3.00	0.00	1.00	1.00	4.00	0.00	1.00	3.00

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (CS)	C	RR	AR	IR	CR	Average Population (P)
Indigenous Right Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
HR 8	3.00	5.00	5.00	2.00	0.00	2.00	1.00	1.67	0.00	0.67	0.67
Assessment Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
HR9	2.00	1.00	4.00	0.00	0.00	0.00	1.00	0.5	0.00	0.00	0.00
Supplier Human Right Assessment Aspect	4.00	15.00	3.00	0.00	0.00	0.00	1.00	3.75	0.00	0.00	0.00
HR10	1.00	1.00	3.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
HR11	5.00	5.00	6.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Human Right Grievance Mechanisms Aspect	3.00	8.00	3.00	0.00	0.00	0.00	1.00	2.67	0.00	0.00	0.00
HR12	3.00	4.00	5.00	0.00	0.00	0.00	1.00	1.33	0.00	0.00	0.00
Total	67.00	115.00	89.00	12.00	8.00	7.00	0.92	1.72	0.12	0.10	0.18

Table 8.211 Schema Metrics and Knowledgebase Metrics for SO Aspects

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (CS)	C'	RR	AR	IR	CR	Average Population (P)
Society Category	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Society Aspect	7.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Community Aspect	3.00	9.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
SO1	4.00	8.00	4.00	8.00	0.00	4.00	1.00	2.00	0.00	1.00	2.00
SO2	1.00	4.00	1.00	3.00	0.00	1.00	1.00	4.00	0.00	1.00	3.00
Anti-Corruption Aspect	5.00	12.00	3.00	0.00	0.00	0.00	1.00	2.40	0.00	0.00	0.00
SO3	2.00	2.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
SO4	5.00	5.00	5.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
SO5	2.00	4.00	4.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
Public Policy Aspect	2.00	8.00	3.00	0.00	0.00	0.00	1.00	4.00	0.00	0.00	0.00
SO6	1.00	3.00	2.00	3.00	0.00	1.00	1.00	3.00	0.00	1.00	0.00
Anti-Competitive Behavior	1.00	6.00	3.00	0.00	0.00	0.00	1.00	6.00	0.00	0.00	0.00
SO7	1.00	2.00	3.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
Compliance Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
SO8	3.00	5.00	4.00	3.00	0.00	1.00	1.00	1.67	0.00	0.33	1.00
Supplier Assessment For Impact On Society	4.00	15.00	3.00	0.00	0.00	0.00	1.00	3.75	0.00	0.00	0.00

Indicator and Aspect	Class (C)	Data property (att)	Object Property (P)	Instance (I)	Number of Sub-class (CS)	C'	RR	AR	IR	CR	Average Population (P)
SO9	1.00	1.00	3.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
SO10	5.00	5.00	6.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
Grievance Mechanisms For Impact On Society	3.00	8.00	3.00	0.00	0.00	0.00	1.00	2.67	0.00	0.00	0.00
SO11	3.00	7.00	5.00	4.00	0.00	3.00	1.00	2.33	0.00	1.00	1.33
Total	56.00	110.00	62.00	21.00	0.00	10.00	1.00	1.96	0.00	0.18	0.38

Table 8.212 Schema Metrics and Knowledgebase Metrics for PR Aspects

Indicator and Aspect	Class (C)	Data property (att)	Object property (P)	Instance (I)	Number of Sub-class (SC)	C'	RR	AR	IR	CR	Average Population (P)
Product Responsibility Category	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Product Responsibility Aspect	5.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Customer Health And Safety Aspect	4.00	14.00	3.00	0.00	0.00	0.00	1.00	3.5	0.00	0.00	0.00
PR1	1.00	1.00	2.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00
PR2	3.00	4.00	3.00	1.00	0.00	0.00	1.00	1.33	0.00	0.00	0.33

Indicator and Aspect	Class (C)	Data property (att)	Object property (P)	Instance (I)	Number of Sub-class (SC)	C'	RR	AR	IR	CR	Average Population (P)
Product And Service labeling Aspect	5.00	9.00	3.00	0.00	0.00	0.00	1.00	1.8	0.00	0.00	0.00
PR3	1.00	6.00	3.00	0.00	0.00	0.00	1.00	6.00	0.00	0.00	0.00
PR4	3.00	4.00	3.00	0.00	0.00	0.00	1.00	1.33	0.00	0.00	0.00
PR5	2.00	4.00	4.00	2.00	3.00	2.00	0.57	2.00	1.50	1.00	1.00
Marketing Communications Aspect	3.00	6.00	3.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
PR6	2.00	3.00	5.00	0.00	0.00	0.00	1.00	1.50	0.00	0.00	0.00
PR7	3.00	4.00	3.00	1.00	0.00	1.00	1.00	1.33	0.00	0.33	0.33
Customer Privacy Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
PR8	2.00	7.00	5.00	3.00	5.00	3.00	0.50	3.50	2.50	1.50	1.50
Compliance On Product Responsibility Aspect	2.00	6.00	3.00	0.00	0.00	0.00	1.00	3.00	0.00	0.00	0.00
PR9	1.00	2.00	4.00	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00
Total	40.00	76.00	49.00	7.00	8.00	6.00	0.86	1.90	0.20	0.15	0.18

Table 8.213 Summary of Schema Metrics and Knowledgebase Metrics for ‘General Standard Disclosure’ class and ‘Specific Standard Disclosure’ class

Standard Disclosure	Class (C)	Data property (att)	Object property (P)	Instance (I)	Number of Sub-class (SC)	C`	RR	AR	IR	CR	Average Population (P)
General Standard Disclosure	74.00	116.00	14.00	122.00	0.00	57.00	1.00	1.57	0.00	0.77	1.65
Specific Standard Disclosure/ EC	64.00	193.00	59.00	173.00	0.00	29.00	1.00	3.02	0.00	0.45	2.70
Specific Standard Disclosure/ EN	232.00	366.00	200.00	111.00	134.00	56.00	0.60	1.58	0.58	0.24	0.48
Specific Standard Disclosure/ LA	85.00	149.00	96.00	169.00	10.00	41.00	0.91	1.75	0.12	0.48	1.99
Specific Standard Disclosure/ HR	67.00	115.00	89.00	12.00	8.00	7.00	0.92	1.72	0.12	0.10	0.18
Specific Standard Disclosure/ SO	56.00	110.00	62.00	21.00	0.00	10.00	1.00	1.96	0.00	0.18	0.38
Specific Standard Disclosure/ PR	40.00	76.00	49.00	7.00	8.00	6.00	0.86	1.90	0.20	0.15	0.18
Total	618.00	1125.00	569.00	615.00	160.00	206.00	0.78	1.85	0.26	0.33	1.00

8.4.2. Ontology validation

Ontology validation is carried out to ensure that the created ontology is a true representation of the systems it is intended to represent. Moreover, the validation is intended to confirm that the ontology definitions really model the real world for which the ontology was created. The overall aim is to ensure that the world model is aligned with the world that has been formally modelled (Gómez-Pérez 2004, 2001, 1996, 1995). It is an important part of assessing the quality of ontology, and usually the only way to ensure the correctness of the knowledge encoded in the ontology (Vrandečić 2010). It requires a common understanding between the domain knowledge experts and ontology engineering experts. For this purpose, SPARQL queries are used to extract answers for the competency questions after SPARQL queries are created in section 8.3. The extracted answers for the competency questions are listed in detail in Appendix B. These extracted answers are the correct answers that confirm that the reported data are instantiated and correctly describe all relationships between the data. Therefore, the developed ontology for the Sustainability Report is valid.

8.5. Conclusion

The objective of this chapter is to implement and evaluate the ontology for a sustainability report. OWL language and the Protégé tool are used to encode the 204 competency questions and SPARQL Queries are created after implementing all classes, data properties, object properties that have been identified from GRI G4 and the data instances are collected from four Australian companies (ORG, BHP, TCL, and AMC) for FY (2014) online. To validate the ontology, the answers to 204 SPARQL Queries are extracted and listed in Appendix B and the validity of ontology for the Sustainability Report is evaluated. In addition, Schema Metrics and Knowledgebase Metrics are used to verify the ontology in terms of (RR), (AR), (IR), (CR), and (Average Population) (P) for ‘General Standard Disclosure’ class and ‘Specific Standard class’ and results are obtained according to the number of classes, data properties, object properties, sub-classes, classes used, and data instances available. Chapter 9 summaries all of the work completed and the associated findings. In addition, the limitations of this study and future research directions are covered.

Chapter 9. Thesis Conclusion

9.1. Summary and findings

9.1.1. Summary

In this section, a summary of the main findings is presented.

Chapter 1 introduced Sustainability Reporting and the research questions and aims of this study.

Chapter 2 looked at the evolution of Sustainability Reporting and the GRI.

The literature on ontology in the accounting domain was reviewed in Chapter 3. To address the issue of the lack of a theoretical framework for reporting environmental and social impacts, a comprehensive sustainability reporting framework was developed by the GRI, and the current G4 guidelines are considered best practice. To formally model the real world of Sustainability Reporting, ontology has provided a shared and common understanding of terms and vocabulary that can be communicated among stakeholders in an organization, and computer software to facilitate the sharing and reutilization of knowledge. The methodology adopted included four phases: specification, conceptualization, formalization, and implementation.

A requirement specification for Sustainability Reporting ontology was created by identifying the intended scope and the purpose to address the various ontology scenarios. This was presented in the first section of Chapter 4. The classes, properties, and relationships for Sustainability Reporting based on the GRI G4 were identified. A conceptual model was transformed into a formalized model using UML to represent the ontology formalization for the 'General Standard Disclosure' class and this is elaborated on in the second section of Chapter 4, and the 'Specific Standard Disclosure' class which was organized under the 'Economic Category' class, 'Environmental Category' class, and 'Social Category' class that were explained in detail in Chapters 5 to 7, inclusively.

In Chapter 8, the implemented ontology using OWL language and the Protégé tool to encode 204 competency questions and SPARQL Queries were created and are shown in Tables 8.2 to 8.205. Instances data were collected online for four Australian companies listed within the ASX for FY 2014; these are ORG, AMC, TCL, and BHP. The evaluation ontology of content to meet the 3Cs criteria of completeness, consistency, and conciseness was verified and the answers to 204 SPARQL Queries were obtained as shown in App. B Tables 1 to 204. These answers show that the reported data are instantiated and correctly describe all relationships between the data. Hence, the developed ontology for Sustainability Reporting is valid.

Thus, the fourth objective of this research, which is to develop ontology for Sustainability Reporting, was achieved and is presented in detail in Chapters 4 to 8. The main contribution of the thesis is that it provides a formal framework for concepts, properties, and relationships for Sustainability Reporting based on GRI G4 guidelines. The framework facilitates knowledge-sharing among stakeholders and computer software through a shared and common understanding of terms and vocabulary for Sustainability Reporting. It also helps to store knowledge in a repository which can be automatically renewed to be compatible with the new generation of GRI.

9.1.2. Findings

Findings from this research are summarized in the following sub-sections. These findings demonstrate the effectiveness of the ontology as constructed within the scope of this study and fulfil the original research objectives as discussed in the Introduction (Chapter 1) and Methodology (Chapter 4).

9.1.2.1. Findings about Australian companies practiced GRI and other initiatives

There is clear evidence that few Australian companies have adopted either GRI or other initiatives and standards. Among the top 200 ASX companies according to Market Capitalization ranking and 23 GICS Industries for FY 2014, it is found that the number and the percentage of companies that had chosen GRI with different versions were 32 and 16% as follows: G3:5, G3.1: 7, and G4: 20 and the number has grown slightly to G4 due to the voluntary nature of this report; the highest number of companies was 4, belonging to the Metals & Mining GICS Industry. Whereas, among the top 200 ASX listed companies according to Market Capitalization ranking and 23 GICS Industry for FY 2014, it is found that the number and the percentage of companies that had chosen other initiatives were 9 and 4.5% and the highest number of companies was 2 from the Diversified Consumer Services GICS Industry.

In relation to the selected companies providing reports, ORG, AMC, and TCL produced their Sustainability Reports based on G4 in accordance with the “Core” option. Whereas, BHP produced a report according to G3. However, BHP’s report was informative. ORG and BHP data instances were used as the basis for this research and missing data were taken from AMC and TCL.

9.1.2.2. Findings about disclosure on ‘General Standard Disclosure’ class

There are varying degrees of disclosure for the ‘General and Specific Standard Disclosure’ class information among the four selected companies for which data instances were extracted.

The ORG company disclosed most items for the ‘General Standard Disclosure’ class and the absent data was obtained from other companies; for example, for G4-9 the TCL and BHP data instances are used. For G4-10 (c and d) and G4-11, the TCL data instances are used. For G4-18 the AMC data instances were used. The results can be found in App. B- Tables 1 to 58.

9.1.2.3. Findings about disclosure on 'Economic performance Indicator' class

The majority of instances relating to economic indicators' data instances was extracted from BHP, in particular for EC1, EC2, and EC9 (full disclosures), EC3 and EC6 (partial disclosures). This company is unique in terms of the quantity and quality of information disclosed. Whereas, the ORG data instances disclosure for EC7 was found to be optimal. There was a dearth of disclosure for EC4, EC5, and EC8 by any company in the sample. The valid answers are shown in App. B- Tables 59 to 85.

9.1.2.4. Findings about disclosure on 'Environmental Performance Indicator' class

For environmental indicators, AMC was the sole company that disclosed on EN1 and EN2 due to its operations in paper packaging and its recycling input material. The answers valid are presented in App. B- Tables 86 to 88.

There was partial disclosure by BHP for EN3, EN6, and EN7 and a lack of disclosures for EN4 and EN5 by others companies as well. The answers approved appear in App. B- Table 89 to 94. ORG disclosed for EN8, EN9, and EN10 appropriately. Certified answers are included in App. B- Table 95 to 106.

BHP and ORG not all data instances for EN11 are disclosed as indicated by the answers in App. B- Table 107 to 110. The AMC was the only one that disclosed for EN12 as shown by the answers in App. B- Table 111 and 112. BHP to some extent disclosed for EN13 as indicated by the answers in App. B- Table 113. ORG completely disclosed for EN 14 as shown in App. B- Tables 114 to 116.

BHP disclosed some information for EN15 to EN21 as the answers illustrated in App. B- Table 117 to 127. ORG and BHP companies partly disclosed instances for EN22 to EN24 as indicated by the answers shown in App. B- Table 128 to 134. No one of the selected companies provided data instances for EN25 and EN26. BHP partially disclosed instances for EN27 as the answers presented in App. B- Table 133 demonstrate. There is no reference to EN28 by any of the companies. BHP wholly disclosed instances for EN29 as shown by the answers in App. B- Table 134.

No instances were reported with respect to EN30, EN31 by any of the companies. However, BHP provided incomplete disclosures to EN32 as shown in App. B- Table 135. No data instances could be found for EN33 by any companies, although ORG fully disclosed for EN34 as illustrated by the answers in App. B- Tables 136 to 138.

9.1.2.5. Findings about disclosure on ‘Labor Practice And Decent Work Performance Indicator’ class

TCL completely disclosed instances for LA1 as the answers indicated in App. B- Tables 139 to 144. ORG partly disclosed for LA2 as indicated by the answers in App. B- Table 145. TCL completely disclosed instances on LA3 as the answers shown in App. B- Tables 146 to 151 demonstrate. TCL also entirely disclosed instances for LA4 and the answers appear in App. B- Tables 152 and 153.

ORG partially disclosed instances for LA5 as the answers shown in App. B- Table 154 indicate. BHP, AMC, and ORG provided a degree of disclosure for LA6 as the answers presented in App. B- Tables 155 to 161 indicate. ORG again totally disclosed instances on LA8 as shown by the answers in App. B- Table 162. TCL completely disclosed instances on LA9 as indicated by the answers in App. B- Tables 163 and 164.

BHP fully disclosed instances for LA10 as the answers shown in App. B- Tables 165 and 166. ORG partly disclosed instances for LA11 as demonstrated by the answers displayed in App. B- Table 167. TCL partly disclosed instances for LA12 as shown by the answers presented in App. B- Tables 168 to 175.

BHP partly disclosed instances for LA13 as the answers indicated in App. B- Table 176 and 177. No references were made to LA14 and LA15 by any of these companies. TCL entirely disclosed instances for LA16 as shown by the answers displayed in App. B- Tables 178 to 180.

9.1.2.6. Findings about disclosure on ‘Human Right Performance Indicator’ class

None of the selected companies made reference to HR1.

TCL partly disclosed instances for HR2 as the answers show in App. B- Table 181. BHP to some extent disclosed instances for HR3 as the answers displayed in App. B- Table 182 to 184. No references were made to HR4, HR5, HR6, HR9, HR10, HR11, and HR12 by any company. BHP again disclosed some instances for HR7 and HR8 as shown by the answers in App. B- Tables 185 to 187.

9.1.2.7. Findings about disclosure on ‘Society Performance Indicator’ class

ORG fully disclosed instances on SO1 and SO2 as the answers indicated in App. B- Table 188 to 192.

There is no reference for SO3 to SO5 by any of the companies. ORG partially disclosed instances for SO6 as the answers shown in App. B- Table 193. There was no data instances disclosed for SO7 by any company. BHP partly disclosed instances for SO8 as the answers in App. B- Table 194 indicated. There were no data instances disclosed for SO9 and SO10 by any selected companies. ORG fully disclosed instances for SO11 as the answers show in App. B- Table 195 to 197.

9.1.2.8. Findings about disclosure on 'Product Performance Indicator' class

Data disclosures were limited for this indicator class. For example, there were no data instances reported for PR1, PR3, PR4, PR6, and PR9 by any selected companies. There was a minor disclosure by AMC for PR2 as the answers presented in App. B- Table 198 indicate. RG partly disclosed instances on PR5 as the answers displayed in App. B- Table 199 to 200 indicate. ORG provided a minor disclosure for PR7 as the answers shown in App. B- Table 201 show. Finally, TCL disclosed some data for PR8 as illustrated by the answers in App. B- Tables 202 to 204.

9.1.2.9. Findings about disclosure on Schema Metrics and Knowledgebase Metrics and Validation

The summary of Schema Metrics and Knowledgebase Metrics for 'General Standard Disclosure' class and 'Specific Standard Disclosure' class in terms of total number of classes, data properties, object properties, instances, number of sub-classes and non-empty classes were 618, 1125, 569, 615, 160 and 206 respectively. In addition, the richness of relationship RR of 1.00 was for the classes: 'General Standard Disclosure', the EC Aspects, and the SO Aspects, because their contained sub-classes are 0. In addition, for the AR metric, the highest average of data properties was for EC Aspects. Moreover, the highest average of IR was for EN Aspects. Furthermore, the highest number of non-empty classes for 'General Standard Disclosure' class was 0.77. Finally, the highest average population was for EC Aspects was 2.70.

The content of the ontology was thereby validated. SPARQL queries were used to extract answers for the competency questions after creation. These extracted answers were the correct answers and indicate that the reported data are instantiated and correctly describe all relationships between the data within the inclusive set. Therefore, the developed ontology for the Sustainability Report is active.

9.2. Limitations

The chief aim of this applied research is to develop ontology for Sustainability Reporting based on GRI G4. The developed ontology was tested on four large Australian companies from among the top 200 listed with ASX in terms of market capitalization for the financial year 2014. It must be kept in mind that only 32 firms provide independent reports. The four companies are from different industries and sub-industry classifications and, as a result, the findings are not generalizable outside of these industries. However, it is believed that they represent a fair sampling of data instances from within the range of GRI 4 class indicators.

A second limitation relates to the fact that not all instances were testable, given the small number of firms in the sample. It is apparent that all of the selected firms chose not to provide information about what might be considered important indicators within their respective sustainability groupings (e.g., HR1). However, the majority of instances was tested and validated, suggesting that the ontology framework is effective as a reporting instrument.

Only major listed companies were included in the testing and verification process and the model may not be suitable as a cure-all technology for other forms of business, including small and medium-sized firms.

9.3. Future research

It is believed that if the ontology framework developed in this research is packaged for the benefit of firms, it will significantly assist in the organization and reporting of sustainability information that is consistent, logically presented and attractive as a means of facilitating the dissemination of meaningful news about how firms' activities are impacting on the environment and promoting valuable human services.

Furthermore, the ontology package can be adapted to meet future needs and amendments to sustainability guidelines as they emerge. In particular, one should not underestimate the collective impact of small and medium-sized firms, and again the package can be remodeled to accommodate issues they commonly have to face and about which stakeholders deserve to be informed. It is acknowledged that the ontology technology cannot eliminate the fact that it is the business executives who decide how and when they wish to report matters that negatively impact on their economic, social or environmental footprints.

However, an ontology-based package could increase awareness of the need to openly report information in an objective and comprehensive fashion. This of course, would need to be supported by further regulatory control over reporting, which is very likely to occur in the area of the environment. The pressure to provide more information about the effect of business activities on the environment will undoubtedly grow as demonstrated by the international consensus that is gathering momentum in relation to the management of climate change.

The ontology can also be applied as a scientific research facilitator in universities or any educational institution to clarify Sustainability Reporting for accounting students and academics.

Finally, all firms (listed or otherwise) have a moral responsibility to provide some kind of accountability with respect to the sustainability of their activities for the benefit of the wider community. In this respect, they have a responsibility to demonstrate how their activities and decision-making impacts (hopefully positively) on the social, economic and environmental aspects of their performance. One of the hopes of this applied research is that it will make the reporting process easier for large firms in particular, that can use it to provide standardized presentations that cover a multitude of issues and aspects (i.e., an extensive range as provided by the GRI G4). The expectation for the future would be that reporting in some form becomes mandatory for listed companies and that the ontology conforms to the reporting needs of all SMEs.

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Appendices

Appendix A.

Table A.1 Australian companies within ASX which prepared Sustainability Report According to GRI (G.3, G3.1, G4) version from high rank of Market Capitalization*

Order	ASX Code	Company Name	GRI G-version	Name of report	Form of report	GICS** Industry	Web site
1-	CBA	Commonwealth Bank of Australia	G3.1	Sustainability Report	Stand alone	Banks	www.commbank.com.au/sustainability2014
2-	BHP	BHP Billiton Limited	G3 + ICMM ⁽¹⁾	Sustainability Report	Stand alone	Metals & Mining	www.bhpbilliton.com
3-	WES	Wesfarmers Limited	G3	Sustainability Report	Stand alone	Food & Staples Retailing	http://sustainability.wesfarmers.com.au
4-	WOW	Woolworths Limited	G4-Core option	Corporate Responsibility Report	Stand alone	Food & Staples Retailing	www.woolworthslimited.com.au
5-	MQG	Macquarie Group Limited	G3	Environmental, Social and Governance Report	Within annual report	Capital Markets	www.macquarie.com.au
6-	WPL	Woodside Petroleum Limited	G3.1+ IPIECA ⁽²⁾	Sustainability Development Report	Stand alone	Oil, Gas & Consumable Fuels	www.woodside.com.au

Order	ASX Code	Company Name	GRI G-version	Name of report	Form of report	GICS** Industry	Web site
7-	WFD	Westfield Corporation	G4-Core option	Sustainability Report	Stand alone	Real Estate Investment Trusts (REITs)	www.westfieldcorp.com.au
8-	TCL	Transurban Group	G4-Core option	Sustainability Report	Online	Transportation Infrastructure	http://www.transurban.com/SR14
9-	AMC	Amcor Limited	G4-Core option	Sustainability Performance Report	Stand alone	Paper Packaging	www.amcor.com/sustainability
10-	BXB	Brambles Limited	G4-comprehensive option	Corporate Social Responsibility Report	Stand alone	Commercial Services & Supplies	www.brambles.com.au
11-	SYD	Sydney Airport	G4- Core option	Sustainability Report	Stand alone	Transportation Infrastructure	www.sydneyairport.com.au/sustainability
12-	IAG	Insurance Australia Group Limited	GRI G3.1	Sustainability Report	Stand alone	Insurance	www.iag.com.au/sustainable
13-	OSH	Oil Search Limited	G3.1	Sustainability Report	Stand alone	Oil, Gas & Consumable Fuels	sustainability@oilsearch.com
14-	AGL	AGL Energy Limited	G4-Core option	Sustainability Report	Online	Multi-Utilities	www.agl.com.au/sustainability

Order	ASX Code	Company Name	GRI G-version	Name of report	Form of report	GICS** Industry	Web site
15-	AZJ	Aurizon Holdings Limited	G4-Core option	Sustainability Report	Stand alone	Road and Rail	www.aurizon.com.au/sustainability
16-	NCM	Newcrest Mining Limited	G3+ ICM ⁽¹⁾	Sustainability Report	Stand alone	Metals & Mining	www.newcrest.com.au
17-	SGP	Stockland	G4-comprehensive option	Sustainability Report	Online	Real Estate Investment Trusts (REITs)	www.stockland.com.au
18-	ORG	Origin Energy Limited	G4-Core option + UN ⁽³⁾	Sustainability Report	Online	Oil, Gas & Consumable Fuels	www.originenergy.com.au/sustainability
19-	IPL	Incitec Pivot Limited	G4-Core option	Sustainability Report	Within annual Report	Chemicals	www.incitecpivot.com.au
20-	MGR	Mirvac Group	G3.1	Sustainability Report	Stand alone	Real Estate Investment Trusts (REITs)	http://www.mirvac/sustainability
21-	FMG	Fortescue Metals Group Ltd	G4-Core option	Corporate Social responsibility Report	Within annual Report	Metals & Mining	www.fmgl.com.au

Order	ASX Code	Company Name	GRI G-version	Name of report	Form of report	GICS** Industry	Web site
22-	CGF	Challenger Limited	G4-Core option	Sustainability Report	Stand alone	Diversified Financial Services	www.challenger.com.au
23-	STO	Santos Limited	GRI4 + IPIECA ⁽²⁾	Sustainability Report	Stand alone	Oil, Gas & Consumable Fuels	www.santos.com/sustainability
24-	AWC	Alumina Limited	G4- comprehensive option	Sustainability Report	Online	Metals & Mining	www.aluminalimited.com
25-	ABC	Adelaide Brighton Limited	G4	Sustainability Report	Within annual Report	Construction Materials	www.adbri.com.au
26-	ILU	Iluka Resources Limited	G4	Sustainability	Within annual Report	Metals & Mining	www.iluka.com
27-	IOF	Investa Office Fund	G4	Corporate Governance	Within annual Report	Real Estate Investment Trusts (REITs)	www.investa.com.au/IOF
28-	MEZ	Meridian Energy Limited	G3	Sustainability Report	Stand alone	Independent Power and Renewable Electricity Producers	www.meridianenergy.co.nz

Order	ASX Code	Company Name	GRI G-version	Name of report	Form of report	GICS** Industry	Web site
29-	GNE	Genesis Energy Limited	GRI G3.1 and (EUSS) ⁽⁴⁾	Sustainability Report	Within annual Report	Electric Utilities	www.genesisenergy.co.nz
30-	DOW	Downer EDI Limited	G3.1	Sustainability Report	Stand alone	Commercial Services & Supplies	www.downeredi.com.au
31-	TPI	Transpacific Industries Group Ltd	G4-Core option	Sustainability Report	Stand alone	Commercial Services & Supplies	www.transpacific.com.au
32-	OZL	OZ Minerals Limited	G4 - Core + ICMM ⁽¹⁾	Sustainability Report	Stand alone	Metals & Mining	www.ozminerals.com/sustainability

* <http://datanalysis.morningstar.com.au.dbgw.lis.curtin.edu.au/af/screening/advanced> accessed on 30th of Sep. 2015.

** It refers to Global Industry Classification Standards.

(1) ICMM: International Council on Mining & Metals.

(2) IPIECA: International Petroleum Industry Environmental Conservation Association is the global oil and gas industry association for environmental and social issues.

(3) UN: United Nations, Guiding Principles on Business and Human Rights. Implementing the United Nations “Protect, Respect and remedy” Framework, 2011

(4) EUSS: Electric utility sector supplements.

Table A.2 Australian companies within ASX which prepared Sustainability Report According to other initiatives or standards from high rank of Market Capitalization *

Order	ASX Code	Company Name	Other Standards or Initiatives	Name of report	Form of report	GICS** Industry	Web site
1-	RHC	Ramsay Health Care Limited	FTSE4GoodIndex (specific performance indicators relevant to hospital)	Sustainability Report	Within annual report	Health Care Providers & Service	www.ramsayhealth.com.au
2-	LLC	Lend Lease Group	Global Real Estate Sustainability Benchmark	Sustainability Report	Online within annual report	Real Estate Management & Development	www.lendlease.com
3-	FBU	Fletcher Building Limited	Sustainability relevant to Fletcher Building	Sustainability Report	Stand alone	Construction Materials	www.fbu.com/sustainability
4-	NVT	Navitas Limited	ISO 31000	Corporate Governance Statement	Within annual report	Diversified Consumer Services	www.navitas.com.au
5-	AHG	Automotive Holdings Group Limited	National Greenhouse and Energy Reporting Act 2007 (NGERS) with Clean Energy Regular (CER)	Environment Regulation	within annual report	Specialty Retail	www.linkmarketservices.com.au

Order	ASX Code	Company Name	Other Standards or Initiatives	Name of report	Form of report	GICS** Industry	Web site
6-	IVC	InvoCare Limited	ISO 31000	Corporate Governance Statement	within annual report	Diversified Consumer Services	www.invocare.com.au
7-	TNE	Technology One Limited	ISO 9001 and ISO 27001	Our Strategy	within annual report	Software	www.technologyonecorp.com
8-	SWM	Seven West Media Limited	ISO 31000	Corporate Governance statement	within annual report	Media	www.sevenwestmedia.com.au
9-	MTS	Metcash Limited	ISO 31000: 2009	Corporate Governance Statement	within annual report	Food & Staples Retailing	www.metcash.com.au

* <http://datanalysis.morningstar.com.au.dbgw.lis.curtin.edu.au/af/screening/advanced> accessed on 30th of Sep. 2015.

** It refers to Global Industry Classification Standards.

Appendix B.

Table B.1 ‘Statement From Most Senior Decision Maker Of Org’ class/ G4-1

SPARQL query’s answer to CQ1-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-1RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ1-b	
<p>In an energy abundant nation such as Australia, growing global energy demand presents many opportunities for Origin, as long as we can get the balance right. At Origin, we believe that energy needs to be provided reliably, at an affordable cost and in an environmentally responsible way. These are often competing objectives, therefore finding the right balance between them can be challenging. The decisions Origin makes to balance these objectives affects a wide range of stakeholders and often in different ways. We commit to using forums like our Sustainability Report to explain our choices, to acknowledge their impact on different stakeholders, and disclose how we manage those impacts by the following: Improving our safety culture, creating value for our stakeholders, meeting the needs of our customers, helping customers use energy more efficiently, minimizing the impact on communities, continuing to focus on achieving beneficial outcomes to local communities, continuing to embed Life Saving Rules as mandatory behavior for our entire workforce, increasing gender diversity is an ongoing priority, improvements in the operational performance of our existing businesses and the progress made on Australia Pacific LNG during the year.</p>	
subject	object
orgStrategicPriorityAndKeyTopicForShortMediumTermWithRegardToSustainability "In an energy abundant nation such as Australia, growing global energy demand presents many opportunities for Origin, as long as we can get the balance right. At Origin, we believe that energy needs to be provided	
SPARQL query’s answer to CQ1-c	
<p>Importantly, this year we achieved a 23 per cent improvement in our safety performance with our measure of safety, Total Recordable Injury Frequency Rate, down from 6.5 to 5.0.</p> <p>In the 2014 financial year, Origin distributed \$15.0 billion to its stakeholders, a 3 per cent decrease on the prior year. The largest component, \$12.8 billion, represents our net expenses. We distributed \$1.1 billion to our capital providers and \$783 million to our employees through wages. Royalties and tax expense totaled \$299 million, a significant increase of \$167 million on the prior year. In addition, we distributed \$6.7 million to communities in the form of investment programs, charitable donations, as well as grants provided by the Origin Foundation.</p> <p>As part of continuing to improve our customer service offering, in early 2014 Origin commissioned research to find out what energy consumers wanted and how we could improve.</p> <p>We changed how and when we engage with existing and potential customers. For example, we removed exit fees from our residential plans, extended call center hours, and stopped door knocking and cold calling by Origin for residential sales.</p> <p>We have seen an improvement in customer retention on the back of these initiatives and an increased number of customers taking up new product offerings and payment options. We continue to monitor the satisfaction of our customers to learn how we can do better and act on their responses.</p> <p>We know that the price of energy is a key concern for Australian households. In response, we have increased our efforts to explain to customers the structure of the energy industry, what drives costs and the reasons behind any price increases.</p>	

To assist those customers who may have issues paying their energy bills, we continue to work with them to make provisions and develop payment arrangements over the short term as well as helping them manage electricity costs over the longer term. To help our customers better understand how their choices impact the cost and use of energy we developed a number of educational initiatives. In particular, our online information portal, Energy Explorer and the Energy for Schools program, contain a range of easy to understand information about the world of energy.

We understand our duty of care to those in the communities in which we operate. Embedded in every project we undertake is community engagement, where we listen to community concerns, respond to their needs and take action to help mitigate the impact of our operations.

Traffic has been a key concern in communities surrounding our CSG-to-LNG project, and while this is not a challenge we can easily solve alone, Australia Pacific LNG has invested in regional infrastructure upgrades. Australia Pacific LNG entered into road-upgrade agreements with state and local governments in major development areas with contributions to the value of approximately \$90 million. Australia Pacific LNG also completed a \$20 million upgrade of the Miles Aerodrome to provide regular flights for project employees, removing the need for a substantial amount of road travel.

Currently, CSG provides more than 90 per cent of Queensland’s natural gas needs and 15 per cent of the state’s electricity generation. It is also accepted that gas typically releases less than half the carbon emissions of coal when used in a power plant to generate baseload electricity.

Delivering the best outcomes to those impacted by our operations often involves listening to and working closely with them to understand their needs. An example of this is the introduction of the Water to Landholders program in April 2014, which has been designed in a way that profits landowners. The Fairy meadow Road Irrigation project commenced delivering treated water to 13 properties across an estimated 4,000 hectares of land.

In FY 2014, we continued to embed Life Saving Rules as mandatory behavior for our entire workforce, including contractors. The rules are now clearly entrenched in Origin’s health, safety and environment systems and processes and are taught in day-one inductions for all new employees. As at 30 June 2014, 40 per cent of Origin’s employees were female. Eleven per cent of the Executive Management Team and 27 per cent of senior roles were filled by women. The addition of Maxine Brenner to our Board in November 2013 lifted female representation on our Board to 33 per cent.

subject	object
	orgKeyEventAchievementFailureDuringReportingPeriod "Importantly, this year we achieved a 23 per cent improvement in our safety performance with our measure of safety

SPARQL query’s answer to CQ1-d

We believe that the 2015-16 financial years will be a transitional period for Origin with the commencement of LNG production by Australia Pacific LNG in mid-2015.

The LNG project will deliver a step change in Origin’s earnings and cash flow from the 2016 financial year when the project begins to deliver Australia Pacific LNG projects under its existing long-term contracts.

The first full year of earnings and cash flow from two LNG trains at Australia Pacific LNG is expected in the 2017 financial year, with distributable cash flow² of around US\$1 billion (Origin’s 37.5 per cent share) on average per year thereafter. The step change in cash flow will allow Origin to increase shareholder distributions, maintain an investment grade credit rating and reinvest cash in growing businesses.

Public policy is an important area for our business. Continued change and uncertainty in policy can be very challenging when making large, long-term investments for the future.

One of the key policy responses of particular importance to energy companies is that of climate change, which is widely recognized as a global challenge.

Origin maintains its long-term support of measures to progressively reduce carbon emissions. With the recent change in Australia’s key climate change policies, our business has needed to adjust accordingly.	
subject	object
orgMainChallengeAndTargetForNextYearAndGoalForComing3To5Year "We believe that the 2015-16 financial years will be a transitional period for Origin	
SPARQL query’s answer to CQ1-e	
<p>During the past year, the Australian Government also commenced a review of the Renewable Energy Target. Throughout the debate our position has been clear – Origin supports renewable energy. We have consistently stated that a true 20 per cent target, one that takes into account reduced energy demand, strikes the right balance between encouraging the development of renewables with recognizing the cost on households and businesses.</p> <p>As we look ahead to another year, we can be sure it will bring more change for the energy industry and an equally challenging set of choices for Origin. As always, we do not shy away from these challenges. We will stay focused on balancing the economic, social and environmental aspects of our business, which we believe will help us move towards a more reliable, affordable and sustainable energy future.</p>	
subject	object
orgOtherItemPertainingToOrgStrategicApproach "During the past year, the Australian Government also commenced a review of the Renewable Energy Target. Throughout the debate our position has been clear - Origin supports renewable energy. We have consistently stated that a true 20 per cent	

Table B.2 ‘Key Impact Risk and Opportunity’ class/ G4-2

SPARQL query’s answer to CQ2	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-2RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.3 ‘Name Of Org’ class/G4-3

SPARQL query’s answer to CQ3-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-3RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ3-b	
<p>1- ORG Origin Energy Limited</p> <p>2- BHP BHP Billiton</p> <p>3- TCL Transurban Group</p> <p>4- AMC Amcor Limited</p>	

subject	object
orgNameOfOrg	"1- ORG Origin Energy Limited 2- BHP BHP Billition 3- TCL Transurban Group 4- AMC Amcor Limited"^^<http://www.w3.org/2001/XMLSchema#string>

Table B.4 ‘Primary Brand Product and Service’ class/ G4-4

SPARQL query’s answer CQ4-a

Yes.

subject	object
orgIsGeneralStandardDisclosureG4-4RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>

SPARQL query’s answer to CQ4-b

Origin is the leading Australian integrated energy company focused on gas and oil exploration and production, power generation and energy retailing. The Company is a leading producer of gas in eastern Australia. Origin is Australia’s largest energy retailer servicing 4.3 million electricity, natural gas and LPG customer accounts and has one of the country’s largest and most flexible generation portfolios with approximately 6,010 MW of capacity, through either owned generation or contracted rights. Origin has an upstream Exploration & Production business in Australia and New Zealand, with exploration and production interests principally located in eastern and southern Australia, the Browse and Perth basins in Western Australia, the Bonaparte and Beetaloo basins in the Northern Territory and in New Zealand. Origin holds a 37.5 per cent interest in Australia Pacific LNG which owns extensive CSG reserves, predominantly in the Surat and Bowen basins in Queensland. Australia Pacific LNG has the largest 2P CSG reserves positions in Australia of 14,091 PJe and is developing a large CSG to LNG project that has a nameplate capacity of nine million tonnes of LNG each year for export to supply the growing demand in Asia under long term supply contracts.

In New Zealand, Origin holds a 53.1 per cent interest in Contact Energy, one of New Zealand’s leading integrated generation and energy retailing companies. Contact Energy supplies electricity, gas and LPG to approximately 568,000 commercial and residential customers and has a 22 per cent share of the retail electricity market. Contact Energy owns and operates a generation portfolio of 2,359 MW across New Zealand, the majority of which is renewables and supplies approximately 24 per cent of New Zealand’s electricity needs.

Contact Energy focuses on developing, owning and operating lower cost baseload and flexible generation capacity, and increasing proportion of which is delivered from geothermal and hydro generation, which contributes to an increasingly competitive energy supply. Origin has a strong focus on ensuring the sustainability of its operations is the largest green energy retailer in Australia and has significant investments in renewable energy technologies including wind, geothermal and hydro developments in the Asia Pacific Region.

subject	object
orgPrimaryBrandProductAndServiceName	"Origin is the leading Australian integrated energy company focused on gas and oil exploration and production, power generation and energy retailing. A member of the S&P/ASX 20 Index. The Company is a leading producer of gas in eastern Australia.

Table B.5 ‘Location Of Org Headquarters’ class/ G4-5

SPARQL query’s answer to CQ5-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-5RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ5-b	
Origin’s registered head office is Level 45, Australia Square, 264-278 George Street, Sydney NSW Australia 2000.	
subject	object
orgLocationOfOrgHeadquarterName "Origin’s registered head office is Level 45, Australia Square, 264-278 George Street, Sydney NSW Australia 2000."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.6 ‘Number Of Country Where Org Operate and Name Of Country Where Either Org Has Significant Operation Or Specifically Relevant To Sustainability Topic Covered In Report’ class/ G4-6

SPARQL query’s answer CQ6-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-6RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ6-b	
12.	
subject	object
orgNumberOfCountryWhereOrgOperateG4-6 "12."^^<http://www.w3.org/2001/XMLSchema#decimal>	
SPARQL query’s answer to CQ6-c	
Australia, New Zealand, Chile, Vietnam, Botswana, Kenya, Fiji, Papua New Guinea, Indonesia.	
subject	object
orgNameOfCountryWhereEitherOrgHasSignificantOperationOrSpecificallyRelevantToSustainabilityTopicCoveredInReport "Australia, New Zealand, Chile, Vietnam, Botswana, Kenya, Fiji, Papua New Guinea, Indonesia."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.7 ‘Nature Of Ownership and Legal Form’ class/ G4-7

SPARQL query’s answer to CQ7-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-7RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ7-b	

29. CONTROLLED ENTITIES

	Incorporated in	2014 Ownership interest per cent	inte
Origin Energy Limited	NSW		
Origin Energy Finance Limited	Vic	100	
Huddart Parker Pty Limited <	Vic	100	
Origin Energy NZ Share Plan Limited	NZ	100	
FRL Pty Ltd <	WA	100	
BTS Pty Ltd <	WA	100	
Origin Energy Power Limited <	SA	100	
Origin Energy SWC Limited <	WA	100	
BESP Pty Ltd	Vic	100	
Origin Energy Pinjar Security Pty Limited	Vic	100	
Origin Energy Pinjar Holdings No. 1 Pty Limited	Vic	100	
Origin Energy Pinjar No. 1 Pty Limited	Vic	100	
Origin Energy Pinjar Holdings No. 2 Pty Limited	Vic	100	
Origin Energy Pinjar No. 2 Pty Limited	Vic	100	
Origin Energy Walloons Transmissions Pty Limited	Vic	100	
Origin Energy Eraring Pty Limited < *	NSW	100	
Origin Energy Eraring Services Pty Limited < *	NSW	100	
Origin Energy Holdings Pty Limited <	Vic	100	
Origin Energy Retail Limited <	SA	100	
Origin Energy (Vic) Pty Limited <	Vic	100	
Gasmart (Vic) Pty Ltd <	Vic	100	
Origin Energy (TM) Pty Limited <	Vic	100	
Cogent Energy Pty Ltd	Vic	100	
Origin Energy Electricity Limited <	Vic	100	
Eraring Gentrader Depositor Pty Limited	Vic	100	
Sun Retail Pty Ltd <	Qld	100	
OE Power Pty Limited <	Vic	100	
Origin Energy Uranquinty Power Pty Ltd	Vic	100	
Origin Energy Mortlake Terminal Station No. 1 Pty Limited	Vic	100	
Origin Energy Mortlake Terminal Station No. 2 Pty Limited	Vic	100	
Origin Energy PNG Ltd #	PNG	66.7	
Origin Energy PNG Holdings Limited	PNG	100	
Origin Energy Tasmania Pty Limited <	Tas	100	
The Fiji Gas Co Ltd	Fiji	51	
Tonga Gas Ltd	Tonga	51	
Origin Energy Contracting Limited <	Qld	100	
Origin Energy LPG Limited <	NSW	100	
Origin (LGC) (Aust) Pty Limited <	NSW	100	
Origin Energy SA Pty Limited <	SA	100	
Hylemit Pty Limited	Vic	100	
Speed-E-Gas (NSW) Pty Ltd	NSW	100	

Origin Energy WA Pty Limited <	WA	100
Origin Energy Services Limited <	SA	100
OEL US Inc.	USA	100
Origin Energy NSW Pty Limited <	NSW	100
Origin Energy Asset Management Limited <	SA	100
Origin Energy Pipelines Pty Limited <	NT	100
Origin Energy Pipelines (SESA) Pty Limited	Vic	100
Origin Energy Pipelines (Vic) Holdings Pty Limited <	Vic	100
Origin Energy Pipelines (Vic) Pty Limited <	Vic	100
Origin LPG (Vietnam) LLC	Vietnam	51
Origin Energy Solomons Ltd	Solomon Islands	80
Origin Energy Cook Islands Ltd	Cook Islands	100
Origin Energy Vanuatu Ltd	Vanuatu	100
Origin Energy Samoa Ltd	Western Samoa	100
Origin Energy American Samoa Inc	American Samoa	100
Origin Energy Insurance Singapore Pte Ltd	Singapore	100
Origin Energy Resources Limited <	SA	100
Origin Energy CSG 2 Pty Limited	Vic	100
Origin Energy ATP 788P Pty Limited	Qld	100
Angari Pty Limited <	SA	100
Oil Investments Pty Limited <	SA	100
Origin Energy Southern Africa Holdings Pty Limited	Qld	100
Origin Energy Wallumbilla Transmissions Pty Limited	Vic	100
Oil Company of Australia (Moura) Transmissions Pty Limited <	WA	100
Origin Energy Kenya Pty Limited	Vic	100
Origin Energy Bonaparte Pty Limited <	SA	100
Origin Energy Developments Pty Limited <	ACT	100
Origin Energy Zoca 91-08 Pty Limited <	SA	100
Origin Energy Petroleum Pty Limited <	Qld	100
Origin Energy Browse Pty Ltd	Vic	100
Origin Energy Northwest Limited	UK	100
Sargasco South East Inc	Panama	100
Origin Energy Resources NZ Limited	NZ	100
Kupe Development Limited	NZ	100
Kupe Mining (No.1) Limited	NZ	100
Origin Energy Resources (Kupe) Limited	NZ	100
Origin Energy Resources NZ (Rimu) Limited	NZ	100
Origin Energy Resources NZ (TAWN) Limited	NZ	100
Sargasco NT Pty Ltd <	SA	100
Sargasco Amadeus Pty Ltd <	SA	100
Origin Energy Amadeus Pty Limited <	Qld	100
Amadeus United States Pty Limited <	Qld	100
OE Resources Limited Partnership	NSW	100
Origin Energy Vietnam Pty Limited	Vic	100
Origin Energy Singapore Holdings Pte Limited	Singapore	100
Origin Energy (Song Hong) Pte Limited	Singapore	100
Origin Energy (Block 31) Pte Limited	Singapore	100
Origin Energy (Block 01) Pte Limited	Singapore	100
Origin Energy (L15/50) Pte Limited	Singapore	100
Origin Energy (L26/50) Pte Limited	Singapore	100
Origin Energy (Savannahket) Pte Limited	Singapore	100
Origin Energy Fairview Transmissions Pty Limited	Vic	100

Origin Energy VIC Holdings Pty Limited <	Vic	100
Origin Energy New Zealand Limited	NZ	100
Origin Energy Universal Holdings Limited	NZ	100
Origin Energy Five Star Holdings Limited	NZ	100
Origin Energy Contact Finance Limited	NZ	100
Origin Energy Contact Finance No.2 Limited	NZ	100
Origin Energy Pacific Holdings Limited	NZ	100
Contact Energy Limited	NZ	53.1
Contact Aria Ltd	NZ	53.1
Contact Wind Limited	NZ	53.1
Rockgas Limited	NZ	53.1
Origin Energy Capital Ltd <	Vic	100
Origin Energy Finance Company Pty Limited <	Vic	100
OE JV Co Pty Limited <	Vic	100
OE JV Holdings Pty Limited	Vic	100
Origin Energy LNG Holdings Pte Limited	Singapore	100
OE Mt Stuart General Partnership #	Netherlands	100
Origin Energy Australia Holding BV #	Netherlands	100
Origin Energy Mt Stuart BV #	Netherlands	100
Parbond Pty Limited	NSW	100
Origin Foundation Pty Limited	Vic	100
Origin Renewable Energy Investments No 1 Pty Ltd	Vic	100
Origin Renewable Energy Investments No 2 Pty Ltd	Vic	100
Origin Renewable Energy Pty Ltd	Vic	100
Origin Energy Geothermal Holdings Pty Ltd	Vic	100
Origin Energy Geothermal Pty Ltd	Vic	100
Origin Energy Chile Holdings Pty Limited	Vic	100
Origin Energy Chile S.A. #	Chile	100
Origin Energy Geothermal Chile Limitada #	Chile	100
Origin Energy Generacion Chile SpA #	Chile	100
Origin Energy Geothermal Singapore Pte Limited	Singapore	100
Origin Energy Wind Holdings Pty Ltd	Vic	100
Cullerin Range Wind Farm Pty Ltd	NSW	100
Crystal Brook Wind Farm Pty Limited	NSW	100
Wind Power Pty Ltd	Vic	100
Wind Power Management Pty Ltd	Vic	100
Lexton Wind Farm Pty Ltd	Vic	100
Stockyard Hill Wind Farm Pty Ltd	Vic	100
Tuki Wind Farm Pty Ltd	Vic	100
Dundas Tablelands Wind Farm Pty Limited	Vic	100
Origin Energy Hydro Bermuda Limited	Bermuda	100
Origin Energy Hydro Chile SpA #	Chile	100
<p>< Entered into a Class Order 98/1418 and related deed of cross guarantee with Origin Energy Limited. * Entered into a Class Order 98/1418 during the year ended 30 June 2014. # Controlled entity has a financial reporting period end of 31 December.</p>		

Non-controlling interests in subsidiaries

The following table summarises the information relating to the consolidated entity's controlled entities that have material non-controlling interests (NCI), before any intragroup eliminations. Contact Energy Limited is the only controlled entity with a material non-controlling interest at 30 June 2014 (46.9 per cent; 2013: 46.9 per cent).

	2014 \$million	2013 \$million
Contact Energy Limited (in A\$)		
Current assets	358	422
Non-current assets	5,388	4,805
Current liabilities	579	903
Non-current liabilities	1,838	1,341
Net assets (100 per cent)	3,329	2,983
Carrying amount of NCI (46.9 per cent)	1,561	1,399
Revenue (100 per cent)	2,170	2,005
Profit after tax (100 per cent)	211	159
Total comprehensive income	203	169
Profit allocated to NCI (46.9 per cent)	99	75
Cash flows from operating activities	403	376
Cash flows used in investing activities	(119)	(219)
Cash flows used in financing activities – before dividends to NCI	(267)	(59)
Cash flows used in financing activities – cash dividends to NCI	(78)	(38)
Net (decrease)/increase in cash and cash equivalents (100 per cent)	(61)	60

subject	object
orgNatureOfOwnershipAndLegalForm	"Origin Energy Finance Limited in Vic 100%. Huddart Parker Pty Limited in Vic 100%. Origin Energy NZ Share Plan Limited in NZ

Table B.8 'Market Served' class/ G4-8

SPARQL query's answer to CQ8-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-8RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>
SPARQL query's answer to CQ8-b	
Origin's Energy Markets business is an integrated provider of energy solutions to retail and wholesale markets in Australia and in the Pacific. Energy Markets has a diverse portfolio of gas and coal supply contracts, operates one of Australia's largest, most flexible and diverse generation portfolios with 6,010 MW of generation capacity, and, as Australia's leading electricity, gas and LPG retailer, continues to increase its product and service offerings to customers.	
Year ended 30 June	2014\$ Million
Total Segment Revenue	11,607
Underlying EBITD	1,053
Segment Result	787
Operating cash flow	1,035
Growth capital expenditure	96
subject	object
marketIncludingGeographicBreakdownSectorTypeOfCustomerAndBeneficiaryServedByOrg	"Origin's Energy Markets business is an integrated provider of energy solutions to retail and wholesale markets in Australia and in

Table B.9 'Scale Of Organization' class/G4-9

SPARQL query's answer to CQ9 (a-f)					
<p>Total number of employee: 625.</p> <p>Total number of operations: 130.</p> <p>Net revenue and measurement unit of currency: \$ AU 14518 million.</p> <p>Total capitalization broken down in term of debt and equity: Equity: 13081. Debt: 14149.</p> <p>Quantity of product or service provided: Origin is Australia's largest energy retailer servicing 4.3 million electricity, natural gas and LPG customer accounts and has one of the country's largest and most flexible generation portfolios with approximately 6,010 MW of capacity, through either owned generation or contracted rights. Origin has an upstream Exploration & Production business in Australia and New Zealand, with exploration and production interests principally located in eastern and southern Australia, the Browse and Perth basins in Western Australia, the Bonaparte and Beetaloo basins in the Northern Territory and in New Zealand. Origin holds a 37.5 per cent interest in Australia Pacific LNG which owns extensive CSG reserves, predominantly in the Surat and Bowen basins in Queensland. Australia Pacific LNG has the largest 2P CSG reserves positions in Australia of 14,091 PJe and is developing a large CSG to LNG project that has a nameplate capacity of nine million tonnes of LNG each year for export to supply the growing demand in Asia under long term supply contracts.</p> <p>In New Zealand, Origin holds a 53.1 per cent interest in Contact Energy, one of New Zealand's leading integrated generation and energy retailing companies. Contact Energy supplies electricity, gas and LPG to approximately 568,000 commercial and residential customers and has a 22 per cent share of the retail electricity market. Contact Energy owns and operates a generation portfolio of 2,359 MW across New Zealand, the majority of which is renewables and supplies approximately 24 per cent of New Zealand's electricity needs. Contact Energy focuses on developing, owning and operating lower cost baseload and flexible generation capacity, and increasing proportion of which is delivered from geothermal and hydro generation, which contributes to an increasingly competitive energy supply. Origin has a strong focus on ensuring the sustainability of its operations is the largest green energy retailer in Australia and has significant investments in renewable energy technologies including wind, geothermal and hydro developments in the Asia Pacific Region.</p>					
a-	<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td colspan="2">orgIsGeneralStandardDisclosureG4-9RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean></td> </tr> </tbody> </table>	subject	object	orgIsGeneralStandardDisclosureG4-9RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
subject	object				
orgIsGeneralStandardDisclosureG4-9RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>					
b-	<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>tclTotalNumberOfEmployee</td> <td>"625."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </tbody> </table>	subject	object	tclTotalNumberOfEmployee	"625."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object				
tclTotalNumberOfEmployee	"625."^^<http://www.w3.org/2001/XMLSchema#decimal>				
c-	<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>bhpTotalNumberOfOperation</td> <td>"130.00"^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </tbody> </table>	subject	object	bhpTotalNumberOfOperation	"130.00"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object				
bhpTotalNumberOfOperation	"130.00"^^<http://www.w3.org/2001/XMLSchema#decimal>				
d-					

subject	object
orgNetRevenueAndMeasurementUnitOfCurrency	"\$ AU 14518 million."^^<http://www.w3.org/2001/XMLSchema#string>
e-	
subject	object
orgTotalCapitalizationBrokenDownInTermOfDebtAndEquityAndMeasurementUnitOfCurrency	"Equity: 13081. Debt: 14149. \$ AU million"^^<http://www.w3.org/2001/XMLSchema#string>
f-	
subject	object
orgQuantityOfProductOrServiceProvided	"Origin is Australia's largest energy retailer servicing 4.3 million electricity, natural gas and LPG customer accounts :

Table B.10 'Employment Overview' class/G4-10

SPARQL query's answer to CQ10-a										
Yes.										
<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>orgIsGeneralStandardDisclosureG4-10RequiredForEitherCoreOrComprehensiveOption</td> <td>"true"^^<http://www.w3.org/2001/XMLSchema#boolean></td> </tr> </tbody> </table>	subject	object	orgIsGeneralStandardDisclosureG4-10RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>						
subject	object									
orgIsGeneralStandardDisclosureG4-10RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>									
SPARQL query's answer to CQ10-b										
b1- Total number of employee by permanent employment contract and female, male: 5493: 2153, 3340.										
b2- Total number of employee by fixed term employment contract and female, male: 440: 189, 251.										
b3- Total number of employee by casual employment contract and female, male: 6: 1, 5.										
b4- Total number of employee by employment contract: 5939										
<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>orgTotalNumberOfEmployeeByPermanentEmploymentContractAndFemaleMale</td> <td>"5493: 2153, 3340 ."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> <tr> <td>orgTotalNumberOfEmployeeByFixedTermEmploymentContractAndFemaleMale</td> <td>"440: 189, 251."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> <tr> <td>orgTotalNumberOfEmployeeByEmploymentContract</td> <td>"5939."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> <tr> <td>orgTotalNumberOfEmployeeByCasualEmploymentContractAndFemalMale</td> <td>"6: 1,5."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </tbody> </table>	subject	object	orgTotalNumberOfEmployeeByPermanentEmploymentContractAndFemaleMale	"5493: 2153, 3340 ."^^<http://www.w3.org/2001/XMLSchema#decimal>	orgTotalNumberOfEmployeeByFixedTermEmploymentContractAndFemaleMale	"440: 189, 251."^^<http://www.w3.org/2001/XMLSchema#decimal>	orgTotalNumberOfEmployeeByEmploymentContract	"5939."^^<http://www.w3.org/2001/XMLSchema#decimal>	orgTotalNumberOfEmployeeByCasualEmploymentContractAndFemalMale	"6: 1,5."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object									
orgTotalNumberOfEmployeeByPermanentEmploymentContractAndFemaleMale	"5493: 2153, 3340 ."^^<http://www.w3.org/2001/XMLSchema#decimal>									
orgTotalNumberOfEmployeeByFixedTermEmploymentContractAndFemaleMale	"440: 189, 251."^^<http://www.w3.org/2001/XMLSchema#decimal>									
orgTotalNumberOfEmployeeByEmploymentContract	"5939."^^<http://www.w3.org/2001/XMLSchema#decimal>									
orgTotalNumberOfEmployeeByCasualEmploymentContractAndFemalMale	"6: 1,5."^^<http://www.w3.org/2001/XMLSchema#decimal>									
SPARQL query's answer to CQ10-c										
c1- Total number of permanent employee by employment type: 5493.										
c2- Total number of permanent employee by employment type by full time and female, male: 5109: 1818, 3291.										
c3- Total number of permanent employee by employment type by part time and female, male: 384: 334, 50.										
<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>orgTotalNumberOfPermanentEmploymentByPartTimeAndFemaleMale</td> <td>"384: 334, 50."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> <tr> <td>orgTotalNumberOfPermanentEmployeeByEmploymentType</td> <td>"5493."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> <tr> <td>orgTotalNumberOfPermanentEmploymentByFullTimeAndFemaleMale</td> <td>"5109: 1818, 3291."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </tbody> </table>	subject	object	orgTotalNumberOfPermanentEmploymentByPartTimeAndFemaleMale	"384: 334, 50."^^<http://www.w3.org/2001/XMLSchema#decimal>	orgTotalNumberOfPermanentEmployeeByEmploymentType	"5493."^^<http://www.w3.org/2001/XMLSchema#decimal>	orgTotalNumberOfPermanentEmploymentByFullTimeAndFemaleMale	"5109: 1818, 3291."^^<http://www.w3.org/2001/XMLSchema#decimal>		
subject	object									
orgTotalNumberOfPermanentEmploymentByPartTimeAndFemaleMale	"384: 334, 50."^^<http://www.w3.org/2001/XMLSchema#decimal>									
orgTotalNumberOfPermanentEmployeeByEmploymentType	"5493."^^<http://www.w3.org/2001/XMLSchema#decimal>									
orgTotalNumberOfPermanentEmploymentByFullTimeAndFemaleMale	"5109: 1818, 3291."^^<http://www.w3.org/2001/XMLSchema#decimal>									
SPARQL query's answer to CQ10-d										
d1- Total workforce by employee and supervised worker: 671: 625, 46.										
d2- Total workforce by supervised worker per female, male: 46: 20, 26.										
d3- Total workforce by employee per female, male: 625: 298, 327.										

subject	object
tclTotalWorkforceByEmployeeAndSupervisedWorker	"671: 625, 46."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalWorkforceByEmployeePerFemaleMale	"625: 298, 327."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalWorkforceBySupervisedWorkerPerFemaleMale	"46: 20, 26."^^<http://www.w3.org/2001/XMLSchema#decimal>

SPARQL query's answer to CQ10-e

Workforce region name: VIC, NSW, QLD, and USA.

Total workforce by QLD region and female, male: 5: 2, 3.

Total workforce by VIC region and female, male: 402: 185, 217.

Total workforce by NSW region and female, male: 212: 112, 100.

Total workforce by USA region and female, male: 52: 19, 33.

subject	object
tclTotalWorkforceByVICRegionAndFemaleMale	"402: 185, 217."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalWorkforceByUSARegionAndFemaleMale	"52: 19, 33."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalWorkforceByQLDRegionAndFemaleMale	"5: 2, 3."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalWorkforceByNSWRegionAndFemaleMale	"212: 112, 100."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclWorkforceByRegionName	"VIC, NSW, QLD, and USA."^^<http://www.w3.org/2001/XMLSchema#string>

SPARQL query's answer to CQ10-f

There are no significant variations in employment numbers (such as seasonal variations in employment in the tourism or agricultural industries).

subject	object
orgSignificantVariationInEmploymentNumber	"There are no significant variations in employment numbers (such as seasonal variations in employment in the tourism or agricultural industries)."

Table B.11 'Collective Bargaining Agreement' class/ G4-11

SPARQL query's answer to CQ11-a

Yes.

subject	object
tclIsGeneralStandardDisclosureG4-11RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>

SPARQL query's answer to CQ11-b

18%.

subject	object
tclPercentageOfTotalEmployeeCoveredByCollectiveBargainingAgreement	"18%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.12 ‘Org Supply Chain’ class/ G4-12

SPARQL query’s answer to CQ12-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-12RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ12-b	
<p>Origin has leading integrated operations in the energy production, generation and retail sectors of the Australian energy supply chain, comprising:</p> <ul style="list-style-type: none"> — a large and diverse legacy gas portfolio which, together with flexible gas transport arrangements, supports a strong domestic gas production and supply business; — one of Australia’s largest generation portfolios of approximately 6,010 MW providing flexibility and diversity across fuel, generation type and geography; and — the leading energy retailing position in Australia with approximately 29 per cent market share of electricity and gas retail customer accounts in Australia’s eastern and southern states, servicing over 4.3 million electricity, gas and LPG customers with a diverse portfolio of energy products and solutions including green energy products. 	
subject	object
orgDescribeOrgSupplyChain "Origin has leading integrated operations in the energy production, generation and retail sectors of the Australian energy supply chain, comp	

Table B.13 ‘Significant Change During Reporting Period Regarding Org Size Structure Ownership Supply Chain’ class/ G4-13

SPARQL query’s answer to CQ13-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-13RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ13-b	
<p>The following entities were incorporated/registered during the financial year: Origin Energy LNG Holdings Pte Limited, Origin Energy Generacion Chile SpA and Origin Energy Browse Pty Ltd were incorporated/registered during the year ended 30 June 2014.</p> <p>The following entities ceased to be controlled and were sold/deregistered/struck off during the financial year:</p> <ul style="list-style-type: none"> —Origin Energy Leasing Limited was deregistered during the year ended 30 June 2014. <p>Name changes during the financial year:</p> <p>Eraring Energy Pty Limited to Origin Energy Eraring Pty Limited.</p> <p>Eraring Energy Services Pty Limited to Origin Energy Eraring Services Pty Limited.</p>	
subject	object
orgChangeInLocationOfOrChangeInOperationIncludingFacilityOpeningClosingAndExpansion "The following entities were incorporated/registered during the financial year: Origin Energy LNG	

Table B.14 ‘Precautionary Approach Or Principle Addressed By Org’ class/ G4-14

SPARQL query’s answer to CQ14-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-14RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ14-b	
<p>Origin operates its business in accordance with the 20 HSE Management Standards described in the HSE Management System, with additional detailed controls specified in a suite of HSE and operational risk directives.</p> <p>The HSE Management System is aligned with the requirements of company HSE Policy and recognized international standards including ISO 14001, OHSAS 18001, ISO 31000 and AS 4801 and support the Company in its efforts to comply with legal obligations.</p> <p>Origin’s HSE Management System is premised on adopting a risk based approach to decisions relating to its activities, products and services.</p> <p>Key activities such as major projects are risk assessed during early planning. Risk identification, assessment and control continue throughout the project lifecycle. Further, Our Compass which contains our Purpose, Principles, Values and Commitments underpins our approach to day to day business.</p>	
subject	object
orgWhetherAndHowPrecautionaryApproachOrPrincipleIsAddressed "Origin operates its business in accordance with the 20 HSE Manag	

Table B.15 ‘External Developed Economic Environmental and Social Charter Principle Or Other Initiative To Which Org Subscribe’ class/ G4-15

SPARQL query’s answer to CQ15-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-15RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ15-b	
<p>Origin commits to abiding by all applicable laws and regulations in the places we conduct our activities.</p> <p>In addition, Origin’s activities are guided by:</p> <ul style="list-style-type: none"> — the International Bill of Rights (including the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights); — the International Labor Organization (ILO) Declaration on Fundamental Principles and Rights at Work (which contains the eight core conventions of the ILO, including freedom of association and the right to collective bargaining); — the ILO Indigenous and Tribal Peoples Convention 169 and the UN Declaration on the Rights of Indigenous Peoples; — in instances where security personnel are engaged, applicable international law 	

<p>enforcement principles including the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials, the Code of Conduct for Law Enforcement Officials and the Voluntary Principles on Security and Human Rights; and</p> <p>— the UN Guiding Principles on Business and Human Rights.</p> <p>Origin participates in the following Indexes and Benchmarks:</p> <p>— Dow Jones Sustainability Index</p> <p>— esaa Sustainable Practice Framework</p> <p>— CDP Carbon</p> <p>— CDP Water</p> <p>— FTSE4Good</p>	
subject	object
<p>orgListExternalDevelopedEconomicEnvironmentalAndSocialCharterPrincipleOrOtherInitiativeToWhichOrgSubscribe "Origin commits to abiding by all applicable laws and regulations in the places w</p>	

Table B.16 ‘Membership Of Association and National Or International Advocacy Org’ class/ G4-16

<p>SPARQL query’s answer to CQ16-a</p>	
<p>Yes.</p>	
subject	object
<p>orgIsGeneralStandardDisclosureG4-16RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean></p>	
<p>SPARQL query’s answer to CQ16-b</p>	
<p>Origin is an active member of a number of industry and business associations that are peak industry bodies for the major business areas in which we operate. These include the Business Council of Australia, Australian Petroleum Production and Exploration Association, Energy Supply Association of Australia, Energy Retailers Association of Australia and Queensland Resources Council. Senior executives of Origin are on the Boards of all of these associations and from time to time we hold Chairmanship and other key positions. Our commitment to these organizations is substantial and strategic and we often contribute expertise, project fees and other resources beyond routine membership obligations. For example Grant King is currently Chairman of the Business Council of Australia’s Infrastructure and Sustainable Growth Committee.</p>	
subject	object
<p>orgListMembershipOfAssociationAndNationalOrInternationalAdvocacyOrgInWhichOrgHoldParticipateProvideView "Origin is an active member of a number of indu</p>	

Table B.17 ‘Entity Included In Org Consolidated Financial Statement Or Equivalent Document’ class/G4-17

<p>SPARQL query’s answer to CQ17-a</p>	
<p>Yes.</p>	
subject	object
<p>orgIsGeneralStandardDisclosureG4-17RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean></p>	
<p>SPARQL query’s answer to CQ17-b</p>	

As stated in CQ 7.	
subject	object
orgListAllEntityIncludedInOrgConsolidatedFinancialStatementOrEquivalentDocument "Controlled Entities Incorporated Origin Energy Limited- NSW, Origin Energy Finance Limited-Vic, Huddart Parker Pty Limited-Vic, Origin Energy N	
SPARQL query's answer to CQ17-c	
Yes.	
subject	object
orgWhetherEntityIncludedInOrgConsolidatedFinancialStatementOrEquivalentDocumentIsNotCoveredBySustainabilityReport "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query's answer to CQ17-d	
Contact Energy.	
subject	object
orgNameOfEntityIncludedInOrgConsolidatedFinancialStatementOrEquivalentDocumentIsNotCoveredBySus "Contact Energy."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.18 'Defining Report Content and Aspect Boundary Process'/ G4-18

SPARQL query's answer to CQ18-a	
Yes.	
subject	object
amcIsGeneralStandardDisclosureG4-18RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query's answer to CQ18-b	
<p>The content of this report is guided both by the GRI's Guidance on Defining Report Content and by our established Areas of Focus that are driven by our sustainability strategy.</p> <p>Report content is driven by stakeholder engagement and determined using both internal and external processes, including determining material topics and prioritization. Our Corporate Safety and Sustainability function determines the content of the report.</p> <p>We referred to GRI's Guidance on Defining Report Content when determining the content for this report, following the steps described below:</p> <p>Step 1: Identifying relevant topics</p> <p>Our stakeholders are those who have a direct relationship to, or are impacted by, our business. They include investors and suppliers of capital, co-workers, customers and suppliers, industry bodies, governments, the media and the communities in which we operate.</p> <p>The process we used this year to identify relevant topics to report on included:</p> <ul style="list-style-type: none"> > Interviewing representatives of the stakeholder groups who have a direct relationship to, or are impacted by, the economic, social and environmental impacts of our operations. > Input from the Sustainability Leaders within each Amcor Business > Analyzing the public documents released by stakeholder organizations > Identifying the social, environmental and economic aspects associated with Amcor's current business plans, strategy, risks and opportunities. <p>This process generates a list of environmental, social and economic issues that reflect our significant economic, environmental and social impacts as well as topics that would substantively influence the assessments and decisions of stakeholders. We then compared the list against the sustainability-related risks and opportunities identified by Amcor's Enterprise Risk Management (ERM) program.</p>	

In most cases, the priority issues identified through the materiality assessment were also identified by our ERM program. Any issues that had not been identified by the ERM program were fed back into it for future consideration by our businesses, thereby enhancing the rigour of our approach to sustainability and its integration with the ERM program.

We undertake this full materiality assessment process each 3rd year, using a ‘refresher’ approach during intervening years to determine any newly material issues.

Step 2: Prioritization

The final list of issues was then ranked by our Sustainability Leadership Team, according to importance of each issue to our stakeholders and to Amcor.

Step 3: Validation.

Using the final list of prioritized issues, we mapped the highly material issues to the appropriate GRI Aspect, as per the GRI reporting protocol. We selected indicators within each GRI Aspect that best matched our prioritized issues and that ensured completeness of the report.

subject	object
amcExplainProcessForDefiningReportContentAndAspectBoundary	The content of this report is guided both by the GRI's Guidance on Defining Report Content and by our established Areas o

Table B.19 ‘All Material Aspect Identified In Process For Defining Report Content’ class/ G4-19

SPARQL query's answer to CQ19-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-19RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>
SPARQL query's answer to CQ19-b	
The material Aspects identified in the process for defining report content are:	
Customers:	
Addressing energy affordability, customers care, future energy solutions, and setting sustainable tariffs.	
People:	
Achieving gender diversity, financial performance, and keeping our people safe.	
Environment:	
CSG-to-LNG as cleaner fuel emissions, ensuring sound and stable policy, protecting water resources, and biodiversity.	
Society:	
Impact on communities, land access and coexistence, and sharing economic benefits.	
subject	object
orgListAllMaterialAspectIdentifiedInProcessForDefiningReportContent	"The material Aspects identified in the process for defining repo

Table B.20 ‘Aspect Boundary For Material Aspect Within Org’ class/ G4-20

SPARQL query’s answer to CQ20-a																																																																																	
Yes.																																																																																	
subject	object																																																																																
orgIsGeneralStandardDisclosureG4-20RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>																																																																																	
SPARQL query’s answer to CQ20-b																																																																																	
Yes.																																																																																	
subject	object																																																																																
orgWhetherAspectBoundaryIsMaterialWithinOrg "true"^^<http://www.w3.org/2001/XMLSchema#boolean>																																																																																	
SPARQL query’s answer to CQ20-c																																																																																	
Material Aspect	<table border="1"> <thead> <tr> <th colspan="5">Within the organisation</th> </tr> <tr> <th>Energy Markets</th> <th>LNG</th> <th>Exploration & Production</th> <th>International Development</th> <th>Corporate</th> </tr> </thead> <tbody> <tr> <td>Delivering the Australia Pacific LNG project</td> <td>●</td> <td>●</td> <td></td> <td>●</td> </tr> <tr> <td>Land access and coexistence</td> <td></td> <td>●</td> <td>●</td> <td></td> </tr> <tr> <td>Protecting water resources</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Impact on communities</td> <td>●</td> <td>●</td> <td>●</td> <td></td> </tr> <tr> <td>Sharing economic benefits</td> <td></td> <td>●</td> <td></td> <td>●</td> </tr> <tr> <td>Biodiversity</td> <td>●</td> <td>●</td> <td>●</td> <td></td> </tr> <tr> <td>Customer care</td> <td>●</td> <td></td> <td></td> <td>●</td> </tr> <tr> <td>Addressing energy affordability</td> <td>●</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Emissions</td> <td>●</td> <td>●</td> <td>●</td> <td></td> </tr> <tr> <td>Keeping our people safe</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Ensuring sound and stable policy</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> </tr> <tr> <td>Achieving gender diversity</td> <td></td> <td></td> <td></td> <td>●</td> </tr> <tr> <td>Corporate governance</td> <td></td> <td></td> <td></td> <td>●</td> </tr> <tr> <td>Tomorrow’s energy solutions</td> <td>●</td> <td></td> <td>●</td> <td>●</td> </tr> </tbody> </table>	Within the organisation					Energy Markets	LNG	Exploration & Production	International Development	Corporate	Delivering the Australia Pacific LNG project	●	●		●	Land access and coexistence		●	●		Protecting water resources	●	●	●	●	Impact on communities	●	●	●		Sharing economic benefits		●		●	Biodiversity	●	●	●		Customer care	●			●	Addressing energy affordability	●				Emissions	●	●	●		Keeping our people safe	●	●	●	●	Ensuring sound and stable policy	●	●	●	●	Achieving gender diversity				●	Corporate governance				●	Tomorrow’s energy solutions	●		●	●
Within the organisation																																																																																	
Energy Markets	LNG	Exploration & Production	International Development	Corporate																																																																													
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Tomorrow’s energy solutions	●		●	●																																																																													
subject	object																																																																																
orgAspectBoundaryForMaterialAspectWithinOrg "Material Aspect Delivering the Australia Pacific LNG Project, Land Access and coexistence, Protecting water																																																																																	

Table B.21 ‘Aspect Boundary For Material Aspect Outside Org’ class/ G4-21

SPARQL query’s answer to CQ21-a																																																																																																																																																																																															
Yes.																																																																																																																																																																																															
subject	object																																																																																																																																																																																														
orgIsGeneralStandardDisclosureG4-21RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>																																																																																																																																																																																															
SPARQL query’s answer to CQ21-b																																																																																																																																																																																															
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subject	object																																																																																																																																																																																														
orgWhetherAspectBoundaryIsMaterialOutsideOfOrg "true"^^<http://www.w3.org/2001/XMLSchema#boolean>																																																																																																																																																																																															
SPARQL query’s answer to CQ21-c																																																																																																																																																																																															
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subject	object																																																																																																																																																																																														
orgIdentifyEntityGroupOfEntityOrElementForWhichAspectIsMaterialAndDescribeGeographicalLocationForEntityIdentified "Material Aspect outside the organization: Delivering Pacific LNG Project in Business partners, Employees, Shareholders"																																																																																																																																																																																															

Table B.22 ‘Effect and Reason Of Restatement Of Information Provided In Previous Report’ class/ G4-22

SPARQL query’s answer to CQ22-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-22RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ22-b	
<p>On 1 August 2013, Origin acquired 100 per cent of Eraring Energy Pty Limited and its 100 per cent owned subsidiary Eraring Energy Services Pty Limited. As such, Eraring’s environmental performance is incorporated in to Origin’s sustainability reporting this year. Emissions from Eraring were already included in Origin’s emissions reporting under the Gentrader arrangements for the power station.</p>	
subject	object
orgEffectAndReasonOfRestatementOfInformationProvidedInPreviousReport "On 1 August 2013, Origin acquired 100 per cent of Eraring Energy Pty Limited"	

Table B.23 ‘Significant Change From Previous Reporting Period In Scope and Aspect Boundary’ class/ G4-23

SPARQL query’s answer to CQ23-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-23RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ23-b	
Nil.	
subject	object
orgSignificantChangeFromPreviousReportingPeriodInScopeAndAspectBoundary "Nil."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.24 ‘Stakeholder Group Engaged By Org’ class/ G4-24

SPARQL query’s answer to CQ24-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-24RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ24-b	
They are: Our customers, our employees, our communities, our investors, business partners.	
subject	object
orgListOfStakeholderGroupEngagedByOrg "They are: Our customers, our employees, our communities, our investors, business partners."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.25 ‘Basis For Identification and Selection Of Stakeholder With Whom To Engage’ class/G4-25

SPARQL query’s answer to CQ25-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-25RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ25-b	
<p>Our customers: Create value for our customers by understanding their needs and delivering relevant and competitive energy products and solutions to meet those needs both today and into the future.</p> <p>Our communities: Respect the rights and interests of the communities in which we operate by listening, understanding and working together to manage the environmental, economic and social impacts of our activities.</p> <p>Our employees: Create a rewarding workplace for our people by valuing everyone’s contribution,</p>	

<p>encouraging personal development, recognizing good performance and fostering equality of opportunity.</p> <p>Our investors: Deliver market-leading performance for shareholders by identifying, developing, operating and growing value-creating businesses.</p> <p>Our business partners:</p> <p>Respect the rights and interests of our business partners by working collaboratively to create valued and rewarding partnerships.</p>				
<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>orgBasisForIdentificatonAndSelectionOfStakeholderWithWhomToEngage</td> <td>"Our customers: Create value for our customers by understanding their needs and delivering relevant and competitive ene</td> </tr> </tbody> </table>	subject	object	orgBasisForIdentificatonAndSelectionOfStakeholderWithWhomToEngage	"Our customers: Create value for our customers by understanding their needs and delivering relevant and competitive ene
subject	object			
orgBasisForIdentificatonAndSelectionOfStakeholderWithWhomToEngage	"Our customers: Create value for our customers by understanding their needs and delivering relevant and competitive ene			

Table B.26 ‘Org Approach To Stakeholder Engagement’ class/ G4-26

<p>SPARQL query’s answer to CQ26-a</p>				
<p>Yes.</p>				
<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>orgIsGeneralStandardDisclosureG4-26RequiredForEitherCoreOrComprehensiveOption</td> <td>"true"^^<http://www.w3.org/2001/XMLSchema#boolean></td> </tr> </tbody> </table>	subject	object	orgIsGeneralStandardDisclosureG4-26RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>
subject	object			
orgIsGeneralStandardDisclosureG4-26RequiredForEitherCoreOrComprehensiveOption	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>			
<p>SPARQL query’s answer CQ26-b</p>				
<p>Our customers:</p> <p>Engagement with customers is guided by our Customer Charter. Customers provide us with feedback via letters and emails, contact with our Call Centre, as well as through social media.</p> <p>Origin uses advertising, marketing and news outlets to provide information about products and facts about the energy industry.</p> <p>We undertake qualitative and quantitative market research to better understand customer needs, priorities and perceptions.</p> <p>The Company measures its stakeholder (including shareholder) perceptions through the implementation of an independent benchmark using RepTrak® methodology. Origin’s reputation performance and reputation risk management activities are reported to the Board on a semi-annual basis. The RepTrak® results were incorporated into the corporate affairs and brand strategies throughout the year.</p> <p>We engage with consumer protection regulators and Ombudsmen to help identify systemic problems, and also opportunities to better meet the needs of customers.</p> <p>Our community:</p> <p>Local communities – Ongoing dialogue is underpinned by our Community Engagement Directive. We engage with communities through meetings with community organizations, targeted newsletters, and public information centers in key project areas, project-specific websites and hotlines.</p> <p>In some locations we have Community Relations Advisors (CRAs) employed in the communities where we operate, and convene or participate in formal community reference groups. An example of a formal community reference group is that for the Halladale Black Watch gas development project in Victoria’s South-West.</p> <p>It is chaired by the Moyne Shire Council and comprises representatives from Council, local residents and Origin. The CRAs receive regular project briefings and updates, and provide valuable advice and feedback to Origin.</p> <p>Governments – Regular dialogue and meetings are held with representatives from both state and federal governments, and ministerial departments, including our Managing Director, senior executives and members of Origin’s Corporate Affairs team.</p>				

We also make submissions on policy matters and attend key conferences to understand policy direction and ensure the Company's views are understood.

Industry associations – We are a member of relevant industry and business associations including the Energy Retailers Association of Australia, Energy Supply Association of Australia, Australian Petroleum Production and Exploration Association and the Business Council of Australia.

NGOs – Key Origin executives engage with major environmental and climate change-focused organizations to exchange views and information. In association with our projects and major activities, we engage with NGOs on topics such as management of impacts, sharing economic benefits, and future development of the energy sector.

Media – We engage with Australian and international media through media releases; one-on-one interviews; background briefings and presentations; Boardroom events with key Origin executives; media tours of key assets and operations; and through conferences and events.

Our employees: We conduct culture and engagement surveys to understand the views of our employees.

The findings from an Origin-wide employee engagement survey during FY 2014 showed our employees recognize the importance Origin places on safety, diversity and work-life balance and on setting clear direction through KPIs and delivery against those KPIs. The opportunities for greater focus were in better connecting employees to the vision and strategy of the organization, and also in how we help employees manage change.

We also talk to employees and listen to their feedback via twice yearly employee roadshows held by either the Managing Director or other senior executives in major office locations; senior leadership and Business Unit team meetings and conferences; a company-wide intranet; and operation-specific newsletters, communiqués and announcements.

For our field employees, we favor face-to-face communication such as “toolbox talks” and visits from senior leaders. A twice yearly formal performance management process for all employees ensures roles are clear, skills are developed and opportunities provided.

Our investors:

Engagement with investors is through a number of channels including our Annual General Meeting held each October; reports and portals including a Shareholder Review, Annual Report and Sustainability Report. The development of our new digital platform for sustainability reporting – introduced to coincide with the release of the FY 2014 Sustainability Report – is in part a response to investor demand for more efficient digital access to key information.

Material information is distributed via the ASX. We also conduct analysis and investor briefings, local and international investor roadshows, respond to shareholder enquiries and give industry presentations.

In addition, Origin participates in external benchmarking including the Dow Jones Sustainability Index, FTSE4Good Index, CDP Carbon (formerly the Carbon Disclosure Project), CDP Water, and community investment data verified by London Benchmarking Group (LBG).

Our business partners

Regular communication throughout daily operations, with additional engagement undertaken through formal meetings; representation on joint venture boards; and participation in operating committees.

Origin's Code of Conduct and Supplier Selection and Engagement Directive provide guidance on fair and ethical dealings with suppliers.

subject	object
orgOrgApproachToStakeholderEngagement	"Our customers: Engagement with customers is guided by our Customer Charter. Customers provide us with feedback via letters and emails,

Table B.27 ‘Key Topic and Concern Raised Through Stakeholder Engagement’ class/ G4- 27

SPARQL query’s answer to CQ27-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-27RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ27-b	
<p>Our customers: Energy is an essential commodity used every day by our customers. As a result, energy reliability and affordability are key concerns for our customers. We help customers by providing more visibility on energy use and costs.</p> <p>Origin also commissioned research to learn more about what customers wanted from their energy providers. We have responded directly by abolishing exit fees, extending call center hours, and creating new mechanisms for customer feedback including a series of Customer Service Hubs.</p> <p>Our Communities: We communicate directly with: Local and Indigenous communities around our operations and developments.</p> <p>We also work with intermediaries and influencers who reflect and represent the interests of the broader community. These include:</p> <p>Governments and regulators who are charged with representing community interests. Industry associations which represent the interests of the energy and business sectors. Non-Government Organizations (NGOs) which represent diverse interests including environmental, social and human rights.</p> <p>Media which play a key role in disseminating information to stakeholders and are critical in public debates of both local and national significance.</p>	
subject	object
orgOrgApproachToStakeholderEngagement "Our customers: Energy is an essential commodity used every day by our customers. As a result, energy reliability and affordability are key	

Table B.28 ‘Reporting Period’ class/ G4-28

SPARQL query’s answer to CQ28-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-28RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ28-b	
From 1 July 2013 to 30 June 2014 (FY2014).	
subject	object
orgReportingPeriodForInformationProvided "From 1 July 2013 to 30 June 2014 (FY2014)."	

Table B.29 ‘Date Of Most Recent Previous Report’ class/ G4-29

SPARQL query’s answer to CQ29-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-29RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ29-b	
Origin's previous Sustainability Report was released in October 2013, covering the 2013 financial year.	
subject	object
orgDateOfMostRecentPreviousReport "Origin's previous Sustainability report was released in October 2013, covering the 2013 financial	

Table B.30 ‘Reporting Cycle’ class/ G4-30

SPARQL query’s answer to CQ30-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-30RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ30-b	
Origin releases its Sustainability Report on an annual basis.	
subject	object
orgReportingCycleType "Origin releases its Sustainability Report on an annual basis."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.31 ‘Contact Point For Question Regarding Report Or Report Content’ class/G4-31

SPARQL query’s answer to CQ31-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-31RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ31-b	
<p>We welcome feedback on our report: originsustainability@originenergy.com.au Origin Sustainability Australia Square Level 45, 264-278 George Street Sydney NSW Australia 2000.</p>	
subject	object
orgContactPointForQuestionRegardingReportOrReportContent "originsustainability@originenergy.com.au Origin Sustainability Australia Square Level 45, 264-278 George Street Sydney NSW Australia 2000	

Table B.32 ‘GRI Content Index’ class/ G4-32

SPARQL query’s answer to CQ32-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-32RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ32-b	
Origin’s 2014 Sustainability Report has been developed ‘in accordance’ with the Core GRI Contents Index under the G4 guidelines.	
subject	object
orgInAccordanceOptionOrgHasChosen "in accordance' with the Core GRI Contents Index under the G4 guidelines."^^<http://www.w3.org/2001/XMLSchema#string>	
SPARQL query’s answer to CQ32-c	
The report has not been externally assured, however Scope 1 and 2 emissions figures presented have been assured by Price Waterhouse Coopers and community contributions data presented has been verified by the London Benchmarking Group. The report has been through Origin’s standard internal review and verification process for information for external release.	
subject	object
orgReferenceToExternalAssuranceReportIfReportHasBeenExternallyAssured "The report has not been externally assured, however Scope 1 and 2 emissions figures presented	

Table B.33 ‘Assurance’ class/ G4-33

SPARQL query’s answer to CQ33-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-33RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query’s answer to CQ33-b	
While external assurance has not been sought for this complete report, Scope 1 and 2 emissions figures presented have been assured by Price Waterhouse Coopers and community contributions data presented have been verified by the London Benchmarking Group.	
subject	object
orgOrgPolicyAndCurrentPracticeWithRegardToSeekingExternalAssurance "While external assurance has not been sought for this complete report. Scope	
SPARQL query’s answer to CQ33-c	
The report has been through Origin’s standard internal review and verification process for information for external release.	
subject	object
orgScopeAndBasisOfExternalAssuranceProvided "The report has been through Origin's standard internal review and verification process for information for external release."^^<http://www.w3.org/2001/XMLSchema#string>	
SPARQL query’s answer to CQ33-d	
Partially is independent in regard to Scope1 and 2 emissions, and community contributions.	
subject	object
orgRelationshipBetweenOrgAndAssuranceProvider "Partially is independent in regard to Scope1 and 2 emissions, and community contributions."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.34 'Governance Structure Of Org' class/ G4-34

SPARQL query's answer to CQ34-a																																																																									
Yes.																																																																									
subject	object																																																																								
orgIsGeneralStandardDisclosureG4-34RequiredForEitherCoreOrComprehensiveOption "true"^^<http://www.w3.org/2001/XMLSchema#boolean>																																																																									
SPARQL query's answer to CQ34-b																																																																									
<p>Origin Energy's board is accountable to shareholders for the performance of the Company and is structured to facilitate the effective discharge of its duties and to add value through its deliberations. The Board's size and composition is determined by the Directors, within limits set by Origin's constitution, which requires a Board of between five and 12 Directors. As at 30 June 2014, the Board comprised nine Directors, including two Executive Directors and seven Non-executive Directors, six of whom are considered independent by the Board.</p> <p>Five committees assist the Board in executing its duties relating to audit, remuneration, health, safety and environment, nomination and risk. Each committee has its own Charter which sets out its role, responsibilities, composition, structure, membership requirements and operation. The relevant Committees of the Board are involved in decision making on economic, environmental and social matters in accordance with their respective Charters.</p>																																																																									
subject	object																																																																								
orgGovernanceStructureOfOrgIncludingCommitteeOfHighestGovernanceBody "Origin Energy's board is accountable to shareholders for the performance of the Company and is structured to facilitate the effective discharge of																																																																									
SPARQL query's answer to CQ34-c																																																																									
<table border="1"> <thead> <tr> <th></th> <th style="background-color: #f4a460;">Audit</th> <th style="background-color: #f4a460;">Remuneration</th> <th style="background-color: #f4a460;">Health, Safety & Environment</th> <th style="background-color: #f4a460;">Nomination</th> <th style="background-color: #f4a460;">Risk</th> </tr> </thead> <tbody> <tr> <td colspan="6">Non-executive Directors</td> </tr> <tr> <td>John Akehurst</td> <td></td> <td></td> <td>Chairman</td> <td>Member</td> <td>Member</td> </tr> <tr> <td>Bruce Beeren</td> <td></td> <td>Member</td> <td></td> <td></td> <td>Member</td> </tr> <tr> <td>Maxine Brenner</td> <td>Member</td> <td></td> <td></td> <td></td> <td>Member</td> </tr> <tr> <td>Gordon Cairns</td> <td>Member</td> <td>Member</td> <td>Member</td> <td>Chairman</td> <td>Chairman</td> </tr> <tr> <td>Bruce Morgan</td> <td>Chairman</td> <td></td> <td>Member</td> <td>Member</td> <td>Member</td> </tr> <tr> <td>Ralph Norris</td> <td>Member</td> <td>Member</td> <td></td> <td></td> <td>Member</td> </tr> <tr> <td>Helen Nugent</td> <td>Member</td> <td>Chairman</td> <td></td> <td>Member</td> <td>Member</td> </tr> <tr> <td colspan="6">Executive Directors</td> </tr> <tr> <td>Grant King</td> <td></td> <td></td> <td>Member</td> <td></td> <td>Member</td> </tr> <tr> <td>Karen Moses</td> <td></td> <td></td> <td></td> <td></td> <td>Member</td> </tr> </tbody> </table>			Audit	Remuneration	Health, Safety & Environment	Nomination	Risk	Non-executive Directors						John Akehurst			Chairman	Member	Member	Bruce Beeren		Member			Member	Maxine Brenner	Member				Member	Gordon Cairns	Member	Member	Member	Chairman	Chairman	Bruce Morgan	Chairman		Member	Member	Member	Ralph Norris	Member	Member			Member	Helen Nugent	Member	Chairman		Member	Member	Executive Directors						Grant King			Member		Member	Karen Moses					Member
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orgIdentifyCommitteeResponsibleForDecisionMakingOnSustainabilityImpact "Audit Remuneration Health, Safety Nomination Risk Environment Non-executive Directors John Akehurst Chairman Member Member																																																																									

Table B.35 'Process For Delegating Authority For Sustainability Topic' class/ G4-35

SPARQL query's answer to CQ35	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-35RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.36 ‘Appointed Executive Level Position With Responsibility For Sustainability Topic’ class/ G4-36

SPARQL query’s answer to CQ36	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-36RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.37 ‘Process For Consultation Between Stakeholder and Highest Governance Body On Sustainability Topic’ class/G4-37

SPARQL query’s answer to CQ37	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-37RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.38 ‘Composition Of Highest Governance Body and Highest Governance Body Committee’ class/ G4-38

SPARQL query’s answer to CQ38	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-37RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.39 ‘Chair Of Highest Governance Body’ class/ G4-39

SPARQL query’s answer to CQ39	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-39RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.40 ‘Nomination and Selection Process For Highest Governance Body Committee and Criteria Used’/ G4-40

SPARQL query’s answer to CQ40	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-40RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.41 ‘Process For Highest Governance Body To Ensure Conflict Of Interest Avoiding and Managing’ class/ G4-41

SPARQL query’s answer to CQ41	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-41RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.42 ‘Highest Governance Body Role In Setting Purpose Value and Strategy’ class/ G4-42

SPARQL query’s answer to CQ42	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-42RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.43 ‘Measure Taken To Develop and Enhance Highest Governance Body Collective Knowledge Of Sustainability Topic’ class/ G4-43

SPARQL query’s answer to CQ43	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-43RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.44 ‘Process For Evaluation and Action Taken In Response To Evaluation Of Highest Governance Body Performance’ class/ G4-44

SPARQL query’s answer to CQ44	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-44RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.45 ‘Highest Governance Body Role In Identification and Management Of Sustainability Impact Risk and Opportunity’ class/ G4-45

SPARQL query’s answer to CQ45	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-45RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.46 'Highest Governance Body Role In Reviewing Effectiveness Of Org Risk Management Process For Sustainability Topic' class/ G4-46

SPARQL query's answer to CQ46	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-46RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.47 'Frequency Of Highest Governance Body Review Of Sustainability Impact Risk and Opportunity' class/ G4-47

SPARQL query's answer to CQ47	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-47RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.48 'Highest Committee Or Position That Formally Review and Approve Org Sustainability report and Ensure Covering All Material Aspect' class/ G4-48

SPARQL query's answer to CQ48	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-48RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.49 'Process For Communicating Critical Concern To Highest Governance Body' class/G4-49

SPARQL query's answer to CQ49	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-49RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.50 'Nature and Total Number Of Critical Concern' class/ G4-50

SPARQL query's answer to CQ50	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-50RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.51 'Remuneration Policy For Highest Governance Body and Senior Executive' class/ G4-51

SPARQL query's answer to CQ51	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-51RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.52 'Process For Determining Remuneration' class/ G4-52

SPARQL query's answer to CQ52	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-52RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.53 'How Stakeholder View Is Sought and Taken InTo Account Regarding Remuneration' class/ G4-53

SPARQL query's answer to CQ53	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-53RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.54 'Ratio Of Annual Total Compensation For Org Highest Paid Individual In Each Country Of Significant Operation' class/ G4-54

SPARQL query's answer to CQ54	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-54RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.55 'Ratio Of Percentage Increase In Annual Total Compensation For Org Highest Paid Individual In Each Country Of Significant Operation' class/ G4-55

SPARQL query's answer to CQ55	
No.	
subject	object
orgIsGeneralStandardDisclosureG4-55RequiredInAccordanceWithCoreOption "false"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.56 'Org Value Principle Standard and Norm Of Behavior' class/ G4-56

SPARQL query's answer to CQ56-a	
Yes.	
subject	object
orgIsGeneralStandardDisclosureG4-56RequiredForEitherCoreOrComprehensiveOption"true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
SPARQL query's answer to CQ56-b	
<p>Origin Energy expects all Directors, employees and other persons that act on behalf of the Company to conduct themselves in accordance with Origin Energy's Principles, Values and Commitments and its policies that guide business conduct.</p> <p>These elements are set out in our Code of Conduct. The Code of Conduct also details some key policies and procedures which govern business conduct. These include:</p> <ul style="list-style-type: none"> __ Diversity and Inclusion __ Discrimination, Harassment and Bullying __ Health, Safety and Environment __ Dealing in Securities __ Gifts and Gratuities, Anti Bribery and Facilitation Payments <p>The Company has also established guidelines for the reporting of and dealing with serious concerns.</p> <p>Details of Code of Conduct</p> <p>Origin's Principles, Values and Commitments</p> <p>Origin expects all its directors, employees and other persons acting on behalf of the company, to conduct themselves in accordance with Origin's principles, values and commitments, and the policies that guide business conduct.</p> <p>Principles</p> <p>Origin's principles guide decisions that are right:</p> <ul style="list-style-type: none"> • We conduct ourselves and our business with due care and in accordance with relevant laws and regulations. We have an overriding duty to ensure the health and safety of our employees, and to minimise the health, safety and environmental impacts on our customers and the communities in which we operate. • We will add value to the resources that come under our control. • The value we create will be distributed to stakeholders recognising the need to ensure the sustainability of our business, and its impact on the environment and the communities in which we operate. • We encourage diversity and expression of ideas and opinions but require <p>Alignment with the company's commitments, principles and values and the policies established to implement them.</p> <ul style="list-style-type: none"> • When faced with choices, we make decisions knowing they will be subject to scrutiny. We should be able to demonstrate the soundness of our decisions to all stakeholders. <p>Values</p> <p>Origin's values describe behaviours that are good:</p> <ul style="list-style-type: none"> • Caring: We care about our impact on customers, colleagues, the community, environment and shareholders. • Listening: We listen to the needs of others, knowing that an unfulfilled need creates the best 	

opportunities.

- Learning: We constantly learn and implement new and better ways, sharing information and ideas effectively

- Delivering: We deliver on the commitments made in all areas of performance.

Commitments

Origin's commitments define the outcomes we strive to achieve. We commit to:

- Deliver market-leading performance for shareholders by identifying, developing, operating and growing value-creating businesses.

- Create value for our customers, by understanding their needs and delivering relevant and competitive energy solutions to meet those needs both today and into the future.

- Create a rewarding workplace for our people by valuing everyone's contribution, encouraging personal development, recognising good performance and fostering equality of opportunity.

- Respect the rights and interests of the communities in which we operate, by listening to them, understanding and managing the environmental, economic and social impacts of our activities.

- Respect the rights and interests of our business partners, by working collaboratively to create valued and rewarding partnerships.

Key Policies and Directives

Origin has adopted key policies and directives that govern business conduct and how employees, executives, directors, consultants and contractors must conduct themselves in the pursuit of company objectives.

These include but are not limited to:

- Diversity and Inclusion

- Discrimination, Harassment and Bullying

- Health, Safety and Environment

- Drugs and Alcohol

- Email and Internet Use

- Dealing in Securities

- Gifts and Gratuities, Anti Bribery and Facilitation Payments

- Conflicts of Interest

- Privacy

- Continuous Disclosure

- Competition and Consumer Protection

Reporting of serious concerns

Employees are encouraged to refer to company policies, or their supervisor or manager, if they have concerns about any conduct that may breach the law or Origin's policies. If in doing this an employee is not able to obtain a satisfactory response to their concern, or the concern is of a serious nature that could affect the whole company and its reputation, employees may report their concerns to a higher authority in accordance with the company's policy Dealing with a Serious Concern.

Consequences of breaches of the Code of Conduct

Consistent with Origin's standard employment terms and conditions, Origin requires its employees to comply with all company policies including the Code of Conduct. Compliance will be monitored and any known or suspected instances of non-compliance will be reported to the relevant Executive Team Member for full investigation and appropriate disciplinary action. Confirmation of adherence to the Code of Conduct will also be sought via the Management Questionnaire.

Employees have on-line internet access to the Code of Conduct and its constituent documents.

Employees must ensure they are familiar with all of

the company's policies and complete the online Code of Conduct learning module within 30 days of joining Origin and every 2 years thereafter.

A critical area of compliance is the company's Health, Safety & Environment Policy and supporting management system which require that employees maintain familiarity with and comply with all relevant safety regulations, codes of practice, standards, operating procedures and safety directions affecting their work and work areas.

Employees should also familiarise themselves with Origin's whistleblowing policy called Dealing with a Serious Concern which details the arrangements in place to assist employees in reporting known or suspected instances of inappropriate conduct including Code of Conduct breaches.

A breach of company policy will result in disciplinary action and may result in summary dismissal.

You should also be aware that some breaches could also result in civil or criminal action.

subject	object
orgDescribeOrgValuePrincipleStandardAndNormOfBehavior	"Origin Energy expects all Directors, employees and other persons that act on behalf of the Company to conduct

Table B.57 'Internal and External Mechanism For Seeking Advice On Ethical and Lawful Behavior and Matter Related To Org Integrity' class/ G4-57

SPARQL query's answer to CQ57

No.

subject	object
orgIsGeneralStandardDisclosureG4-57RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.58 'Internal and External Mechanism For Reporting Concern About Unethical Or Unlawful Behavior and Matter Related To Org Integrity' class/ G4-58

SPARQL query's answer to CQ58

No.

subject	object
orgIsGeneralStandardDisclosureG4-58RequiredInAccordanceWithCoreOption	"false"^^<http://www.w3.org/2001/XMLSchema#boolean>

Table B.59 'Economic Value Retained' class

SPARQL query's answer to CQ59(a-e)

a- Economic value retained basis: accruals basis.

b- Region name for economic value retained: Africa and Other, Australia and Asia, Europe, North America, South America.

c- Total value of economic value retained: 17084.

d1- Total value of economic value retained by Africa and Other region: (34).

d2- Total value of economic value retained by Australia and Asia region: 10385.

- d3- Total value of economic value retained by Europe region: (2321).
- d4- Total value of economic value retained by North America region: 4471.
- d5- Total value of economic value retained by South America region: 4583.
- e- Measurement unit currency: \$ US million.

subject	object
bhpEconomicValueRetainedBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpRegionNameForEconomicValueRetained	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpTotalValueOfEconomicValueRetained	"17084."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpTotalValueOfEconomicValueRetainedByAfricaAndOtherRegion	"-34."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueRetainedByNorthAmericaRegion	"4471."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueRetainedByEuropeRegion	"-2321."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueRetainedBySouthAmericaRegion	"4583."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueRetainedByAustraliaAndAsiaRegion	"10385."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.60 'Direct Economic Value Generated' class

SPARQL query's answer to CQ60(a-e)

- a-Direct economic value generated basis: accruals basis.
- b- Region name for direct economic value generated: Africa and Other, Australia and Asia, Europe, North America, South America.
- c-Total value of direct economic value generated: 68083.
- d1- Total value of direct economic value generated by Africa and Other region: 5007.
- d2- Total value of direct economic value generated by Australia and Asia region: 40917.
- d3- Total value of direct economic value generated by Europe region: 172.
- d4- Total value of direct economic value generated by North America region: 9468.
- d5- Total value of direct economic value generated by South America region: 12519.
- e- Measurement unit of currency: \$ US million.

subject	object
bhpDirectEconomicValueGeneratedBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpRegionNameForDirectEconomicValueGenerated	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpTotalValueOfDirectEconomicValueGenerated	"68083"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpTotalValueOfDirectEconomicValueGeneratedByAfricaAndOtherRegion	"5007"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfDirectEconomicValueGeneratedByAustraliaAndAsiaRegion	"40917"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfDirectEconomicValueGeneratedByEuropeRegion	"172"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfDirectEconomicValueGeneratedByNorthAmericaRegion	"9468"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfDirectEconomicValueGeneratedBySouthAmericaRegion	"12519"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.61 'Revenue' class

SPARQL query's answer to CQ61(a-f)	
a- Revenue name: Revenue and other income.	
b- Revenue and other income basis: accruals basis.	
c- Region name for revenue and other income: Africa and Other, Australia and Asia, Europe, North America, South America.	
d- Total value of Revenue and other income: 68083.	
e1- Total value of Revenue and other income by Africa and Other region: 5007.	
e2- Total value of Revenue and other income by Australia and Asia region: 40917.	
e3- Total value of Revenue and other income by Europe region: 172.	
e4- Total value of Revenue and other income by North America region: 9468.	
e5- Total value of Revenue and other income by South America region: 12519.	
f- Measurement unit of currency: \$ US million.	

subject	object
bhpRevenueName	"Revenue and other income."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpRevenueAndOtherIncomeBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpRegionNameForRevenueAndOtherIncome	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpTotalValueOfRevenueAndOtherIncome	"68083"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpTotalValueOfRevenueAndOtherIncomeByAfricaAndOtherRegion	"5007"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfRevenueAndOtherIncomeByAustraliaAndAsiaRegion	"40917"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfRevenueAndOtherIncomeByEuropeRegion	"172"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfRevenueAndOtherIncomeByNorthAmericaRegion	"9468"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfRevenueAndOtherIncomeBySouthAmericaRegion	"12519"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.62 'Economic Value Distributed' class

SPARQL query's answer to CQ62 (a-e)

a- Economic value distributed basis: accruals basis.

b-Region name for economic value distributed: Africa and Other, Australia and Asia, Europe, North America, South America.

c-Total value of Economic value distributed: 50999.

d1- Total value of economic value distributed by Africa and Other region: 5011.

d2- Total value of economic value distributed by Australia and Asia region: 30532.

d3- Total value of economic value distributed by Europe region: 2493.

d4-Total value of economic value distributed by North America region: 4997.

d5-Total value of economic value distributed by South America region: 7936.

e- Measurement unit of currency: \$ US million.

subject	object
bhpEconomicValueDistributedBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpRegionNameForEconomicValueDistributed	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpTotalValueOfEconomicValueDistributed	"50999."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpTotalValueOfEconomicValueDistributedByAustraliaAndAsiaRegion	"30532"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueDistributedBySouthAmericaRegion	"7936"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueDistributedByAfricaAndOtherRegion	"5011"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueDistributedByNorthAmericaRegion	"4997"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEconomicValueDistributedByEuropeRegion	"2493"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.63 ‘Operating Cost’ class

SPARQL query’s answer to CQ63 (a-f)	
<p>a- Operating cost basis: accruals basis.</p> <p>b- Operating cost name: Suppliers, contractors, etc...</p> <p>c- Region name for operating cost: Africa and Other, Australia and Asia, Europe, North America, South America.</p> <p>d1-Total value of payment to supplier contractor by Africa and Other region: 3526.</p> <p>d2-Total value of payment to supplier contractor by Australia and Asia region: 14245.</p> <p>d3-Total value of payment to supplier contractor by Europe region: 15.</p> <p>d4-Total value of payment to supplier contractor by North America region: 3570.</p> <p>d5-Total value of payment to supplier contractor by South America region: 5861.</p> <p>e-Total value of operating cost: 27217.</p> <p>f -Measurement unit currency: \$ US million.</p>	
subject	object
bhpOperatingCostBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpOperatingCostName	"Suppliers, contractors, etc..."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpRegionNameForOperatingCost	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTotalValueOfPaymentToSupplierContractorByAfricaAndOtherRegion	"3526"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToSupplierContractorByAustraliaAndAsiaRegion	"14245"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToSupplierContractorBySouthAmericaRegion	"5861"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToSupplierContractorByEuropeRegion	"15"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToSupplierContractorByNorthAmericaRegion	"3570"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.64 ‘Employee Wage and Benefit’ class

SPARQL query’s answer to CQ64 (a-e)	
<p>a- Employee wage and benefit basis: Accruals basis.</p> <p>b- Region name for employee wage and benefit: Africa and Other, Australia and Asia, Europe, North America, South America.</p> <p>c1-Total value of employee wage and benefit by Africa and Other region: 576.</p> <p>c2-Total value of employee wage and benefit by Australia and Asia region: 4516.</p> <p>c3-Total value of employee wage and benefit by Europe region: 211.</p> <p>c4-Total value of employee wage and benefit by North America region: 834.</p> <p>c5-Total value of employee wage and benefit by South America region: 901.</p> <p>d-Total value of employee wage and benefit: 7038.</p> <p>e- Measurement unit of currency: \$ US million.</p>	

subject	object
bhpEmployeeWageAndBenefitBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>
bhpRegionNameForEmployeeWageAndBenefit	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>
bhpTotalValueOfEmployeeWageAndBenefitByAfricaAndOtherRegion	"576"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEmployeeWageAndBenefitByAustraliaAndAsiaRegion	"4516."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEmployeeWageAndBenefitByEuropeRegion	"211"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEmployeeWageAndBenefitByNorthAmericaRegion	"834"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEmployeeWageAndBenefitBySouthAmericaRegion	"901"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfEmployeeWageAndBenefit	"7038"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.65 'Payment To Provider Of Capital' class

SPARQL query's answer to CQ65	
Payment to provider of capital name: Shareholders dividends and interest payments.	
subject	object
bhpNameForPaymentToProviderOfCapital	"Shareholders dividends and interest payments."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.66 'Payment To Shareholder Dividend' class

SPARQL query's answer to CQ66 (a-f)	
a-Payment to shareholder dividend basis: Accruals basis.	
b-Payment to shareholder dividend by region name: Africa and Other, Australia and Asia, Europe, North America, South America.	
c-Total value of payment to shareholder dividend by Africa and Other region: 506.	
d1-Total value of payment to shareholder dividend by Australia and Asia region: 3807.	
d2-Total value of payment to shareholder dividend by Europe region: 2065.	
d3-Total value of payment to shareholder dividend by North America region: 8.	
d4-Total value of payment to shareholder dividend by South America region: 1.	
e- Total value of payment to shareholder dividend: 6387.	
f-Measurement unit of currency: \$ US million.	
subject	object
bhpPaymentToShareholderDividendBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpRegionNameForPaymentToShareholderDividend	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTotalValueOfPaymentToShareholderDividendBySouthAmericaRegion	"1"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToShareholderDividendByAfricaAndOtherRegion	"506"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToShareholderDividendByAustraliaAndAsiaRegion	"3807"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToShareholderDividendByEuropeRegion	"2065"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToShareholderDividendByNorthAmericaRegion	"8"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpTotalValueOfPaymentToShareholderDividend	"6387"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.67 'Interest Payment' class

SPARQL query's answer to CQ67 (a-e)	
a-Interest payment basis: Accruals basis.	
b- Region name for interest payment: Africa and Other, Australia and Asia, Europe, North America, South America.	
c1-Total value of interest payment by Africa and Other region: 6.	
c2-Total value of Interest payment by Australia and Asia region: 92.	
c3-Total value of Interest payment by Europe region: 176.	
c4-Total value of Interest payment by North America region: 469.	
c5-Total value of Interest payment by South America region: 34.	
d-Total value of Interest payment: 777.	
e- Measurement unit of currency: \$ US million.	
subject	object
bhpInterestPaymentBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpRegionNameForInterestPayment	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTotalValueOfInterestPaymentByAfricaAndOtherRegion	"6"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfInterestPaymentByAustraliaAndAsiaRegion	"92."^^<http://www.w3.org/2001/XMLSchema#string>
bhpTotalValueOfInterestPaymentByEuropeRegion	"176"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfInterestPaymentByNorthAmericaRegion	"469"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfInterestPaymentBySouthAmericaRegion	"34"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpTotalValueOfInterestPayment	"777"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.68 'Payment To Government' class

SPARQL query's answer to CQ68 (a-f)	
<p>a-Payment to government basis: Accruals basis. b-Payment to government name: Gross taxes and royalties. c- Payment to government by region name: Africa and Other, Australia and Asia, Europe, North America, South America. d1- Total value of payment to gross tax and royalty by Africa and Other region: 427. d2- Total value of payment to gross tax and royalty by Australia and Asia region: 7872. d3- Total value of payment to gross tax and royalty by Europe region: 26. d4- Total value of payment to gross tax and royalty by North America region: 116. d5- Total value of payment to gross tax and royalty by South America region: 1139. e- Total value of payment to government: 9580. f- Measurement unit of currency: \$ US million.</p>	
subject	object
bhpPaymentToGovernmentBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpPaymentToGovernmentName	"Gross taxes and royalties."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpRegionNameForPaymentToGovernment	"Africa and Other, Australia and Asia, Europe, North America, South America."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTotalValueOfPaymentToGrossTaxAndRoyaltyByAfricaAndOtherRegion	"427"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToGrossTaxAndRoyaltyByAustraliaAndAsiaRegion	"7872"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToGrossTaxAndRoyaltyByEuropeRegion	"26"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToGrossTaxAndRoyaltyByNorthAmericaRegion	"116"^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTotalValueOfPaymentToGrossTaxAndRoyaltyBySouthAmericaRegion	"1139"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpTotalValueOfPaymentToGovernment	"9580"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.69 'Community Investment' class

SPARQL query's answer to CQ69 (a-e)	
<p>a-Community investment basis: Accruals basis. b-Total value of voluntary community investment: 241.7 c-Region name for community investment expenditure: Australia 50%, South America 36%, North America 8%, Africa 6%, Asia <1%, Europe <1%. d-Community investment expenditure by program category: Education and training 21%, General infrastructure 20%, Environment 17%, Community support (capacity building) 16%, Health 13%, Arts 5%, Sports and recreation 4%, Small business development 3%, Disaster relief 1%. e-Measurement unit of currency: \$ US million.</p>	

subject	object
bhpCommunityInvestmentBasis	"Accruals basis."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTotalValueOfVoluntaryCommunityInvestment	"241.7."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpRegionNameForCommunityInvestmentExpenditure	"Australia 50%, South America 36%, North America 8%, Africa 6%, Asia <1%, Europe <1%."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpCommunityInvestmentExpenditureByProgramCategory	"Education and training 21%, General infrastructure 20%, Environment 17%, Community support (capacity building) 16%, Health 13%, Arts 5%, Sp
subject	object
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.70 'Physical Risk' class

SPARQL query's answer to CQ70	
<p>a- Physical risk driver: Change in precipitation pattern.</p> <p>b-Description of physical risk: Changing precipitation patterns can exacerbate water stress and impact availability of water for our operations.</p> <p>c-Potential impact of physical risk: Reduction/disruption in production capacity.</p> <p>d-Time frame of physical risk: Up to 1 year.</p> <p>e-Direct and indirect impact of physical risk: Direct.</p> <p>f-Likelihood of physical risk: Likely.</p> <p>g- Magnitude of impact for physical risk: Low-medium.</p> <p>h-Financial implication of physical risk: We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and market reduces earnings volatility and ensures that our portfolio is robust across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio.</p> <p>i-Management method of physical risk: A review of physical climate risks and adaptation measures to prevent or mitigate impacts has been conducted. We continue to look for enhancements to our company wide integrated planning framework to allow better assessment of the physical risks associated with climate change and ensure resilience is embedded into our business plans and investment decisions. For example, at our Australian Aluminum operation, new water supply options are being scoped to ensure business resilience to changing precipitation patterns. In addition, discharge patterns from the operation have been adapted to better reflect current environmental flows.</p> <p>j- Cost of management for physical risk: Low.</p>	
subject	object
bhpPhysicalRiskDriver	"Change in precipitation pattern."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpDescriptionOfPhysicalRisk	"Changing precipitation patterns can exacerbate water stress and impact availability of water for our

subject	object
bhpPotentialImpactOfPhysicalRisk	"Reduction/disruption in production capacity."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTimeFrameOfPhysicalRisk	"Up to 1 year."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpDirectAndIndirectImpactOfPhysicalRisk	"Direct."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpLikelihoodOfPhysicalRisk	"Likely."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpMagnitudeOfImpactForPhysicalRisk	"Low-medium."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpFinancialImplicationOfPhysicalRisk	"We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach
subject	object
bhpManagementMethodOfPhysicalRisk	"A review of physical climate risks and adaptation measures to prevent or mitigate impacts has been conducted. We co
subject	object
bhpCostOfManagementForPhysicalRisk	"Low."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.71 'Regulatory Risk' class

SPARQL query's answer to CQ71(a- j)
a-Regulatory risk driver: Carbon taxes.
b-Description of regulatory risk: Australia's carbon pricing mechanism commenced on 1 July 2012 with a fixed price period for three years, moving to a flexible price from 1 July 2015. The carbon price applies to companies with direct emissions greater than 25,000 t CO2e. A number of our Australian operations are directly captured by this scheme. In November 2013, the Australian Federal Government introduced plans to repeal the carbon pricing mechanism, although these have yet to pass into law.
c-Potential impact of rregulatory risk: Increased operational cost.
d-Time frame of rregulatory risk: Up to 1 year.
e-Direct and indirect impact of rregulatory risk: Direct
f-Likelihood of rregulatory risk: Virtually certain.
g- Magnitude of impact for regulatory risk: Low-Medium.
h-Financial implication of regulatory risk: We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and market reduces earnings

volatility and ensures that our portfolio is robust across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio.

i-Management method of regulatory risk: All carbon trading and tax liabilities are centrally managed by our Marketing team in Singapore. We apply our Carbon Pricing Protocol to all new investments to highlight the impact of a carbon price on investments.

j-Cost of management for regulatory risk: Low -medium.

subject	object
bhpRegulatoryRiskDriver	"Carbon taxes."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpDescriptionOfRegulatoryRisk	"Australia's carbon pricing mechanism commenced on 1 July 2012 with a fixed price period for three years, moving to a flexible price from 1 July 2015."
subject	object
bhpPotentialImpactOfRegulatoryRisk	"Increased operational cost."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTimeFrameOfRegulatoryRisk	"Up to 1 year."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpDirectAndIndirectImpactOfRegulatoryRisk	"Direct."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpLikelihoodOfRegulatoryRisk	"Virtually certain."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpMagnitudeOfImpactForRegulatoryRisk	"Low-Medium."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpFinancialImplicationOfRegulatoryRisk	"We manage risk by remaining financially disciplined within the framework of our differentiated and prudent risk management approach."
subject	object
bhpManagementMethodOfRegulatoryRisk	"All carbon trading and tax liabilities are centrally managed by our Marketing team in Singapore. We apply our Carbon Pricing Protocol to all new investments to highlight the impact of a carbon price on investments."
subject	object
bhpCostOfManagementForRegulatoryRisk	"Low -medium."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.72 'Other Risk' class

SPARQL query's answer to CQ72 (a-j)
a-Other risk driver: Reputation.
b-Description of other risk: Potential exposure to increased litigation and unforeseen environmental expenses. Potential for reputation risks with Socially Responsible Investors if our performance and policy commitments fall short of expectations for a leading resources company.

c-Potential impact of other risk: Inability to do business.

d-Time frame of other risk: >6 years.

e-Direct and indirect impact of other risk: Direct.

f-Likelihood of other risk: Unlikely.

g-Magnitude of impact for other risk: Low.

h-Financial implication of other risk: We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and

market reduces earnings volatility and ensures that our portfolio is robust across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio.

i-Management method of other risk: BHP Billiton has a diverse portfolio that is important in meeting global demand for energy. We can, and will, continue to adjust the shape of our portfolio to match energy and commodity demand and meet society's expectations while maximizing shareholder returns. Our approach to investment decision-making and portfolio management ensures that climate change risks are identified, assessed and appropriately addressed. We have been applying an internal price on carbon in our investment decisions for over a decade. Through a comprehensive and strategic approach

to corporate planning, we work with a broad range of scenarios to assess our portfolio, including consideration of a broad range of policy responses to and impacts from climate change. Our models suggest that BHP Billiton's portfolio diversification results in the resilience and strength of our overall asset valuation through all these scenarios. The diversity of our overall portfolio, which includes energy (oil, gas, coal, and uranium), as well as a minerals (including copper, premium quality iron ore and potash), uniquely

positions us not only to manage and respond to changes but also to capture opportunities to grow shareholder value over time.

j- Cost of management for other risk: Low.

subject	object
bhpOtherRiskDriver	"Reputation."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpDescriptionOfOtherRisk	"Potential exposure to increased litigation and unforeseen environmental expenses. Potential for reputation risks

subject	object
bhpPotentialImpactOfOtherRisk	"Inability to do business."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpTimeFrameOfOtherRisk	">6 years."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpDirectAndIndirectImpactOfOtherRisk	"Direct."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpLikelihoodOfOtherRisk	"Unlikely."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpMagnitudeOfImpactForOtherRisk	"Low."^^<http://www.w3.org/2001/XMLSchema#string>
bhpFinancialImplicationOfOtherRisk	"We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and market reduces earnings volatility and ensures that our portfolio is robust across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio."
bhpManagementMethodOfOtherRisk	"BHP Billiton has a diverse portfolio that is important in meeting global demand for energy. We can, and will, continue to adjust the shape of our portfolio to meet the needs of our customers and shareholders."
bhpCostOfManagementForOtherRisk	"Low."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.73 'Physical Opportunity' class

SPARQL query's answer to CQ73 (a-j)	
a-Physical opportunity driver: Change in precipitation pattern.	
b-Description of physical opportunity: Our non-energy commodities will be impacted by adaptation measures, with demand for copper, aluminum, manganese, nickel, iron ore, potash increasing as populations grow, rebuild, relocate and adapt to changing climatic conditions.	
c-Potential impact of physical opportunity: Increased demand for existing products/services.	
d-Time frame of physical opportunity: >6 years.	
e-Direct and indirect impact of physical opportunity: Direct.	
f-likelihood of physical opportunity: More likely than not.	
g-Magnitude of impact for physical opportunity: Low-medium.	
h-Financial implication of physical opportunity: We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and market reduces earnings volatility and ensures that our portfolio is robust across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio.	
i-Management method of physical opportunity: Our strategy to own and operate large, long-life, low-cost, expandable, upstream assets diversified by commodity, geography and market remains the foundation for creating shareholder value. This diversity in products and geographical locations will allow our business to take advantage of adaptation changes that are influenced by climate change.	
j-Cost of management for physical opportunity: Low.	
subject	object
bhpPhysicalOpportunityDriver	"Induced changes in natural resources."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpDescriptionOfPhysicalOpportunity	"Our non-energy commodities will be impacted by adaptation measures, with demand for copper, aluminum, manganese, nickel, iron ore, potash increasing as populations grow, rebuild, relocate and adapt to changing climatic conditions."

subject	object
bhpPotentialImpactOfPhysicalOpportunity	"Increased demand for existing products/services."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTimeFrameOfPhysicalOpportunity	">6 years."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpDirectAndIndirectImpactOfPhysicalOpportunity	"Direct."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpLikelihoodOfPhysicalOpportunity	"More likely than not."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpMagnitudeOfImpactForPhysicalOpportunity	"Low-medium."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpFinancialImplicationOfPhysicalOpportunity	"We manage risk by remaining financially disciplined within the framework of our differentiated and proven
subject	object
bhpManagementMethodOfPhysicalOpportunity	"Our strategy to own and operate large, long-life, low-cost, expandable, upstream assets diversified
subject	object
bhpCostOfManagementForPhysicalOpportunity	"Low."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.74 'Regulatory Opportunity' class

SPARQL query's answer to CQ74 (a-j)
<p>a- Regulatory opportunity driver: General environmental regulations, including planning.</p> <p>b-Description of regulatory opportunity: Energy efficiency opportunity regulations in Australia require operations to investigate energy reduction opportunities and report these publically. These opportunities can reduce energy costs and deliver GHG reductions.</p> <p>c-Potential impact of rregulatory opportunity: Reduced operational costs.</p> <p>d-Time frame of rregulatory opportunity: Up to 1 year.</p> <p>e-Direct and indirect impact of rregulatory opportunity: Direct.</p> <p>f-Likelihood of rregulatory opportunity: Likely.</p> <p>g-Magnitude of impact for regulatory opportunity: Low.</p> <p>h-Financial implication of regulatory opportunity: We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and market reduces earnings volatility and ensures that our portfolio is robust</p>

across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio.

i-Management method of regulatory opportunity: The Group head office in Melbourne coordinates compliance and reporting on behalf of the Australia Assets, including

review of opportunities by the Board. Assets assume responsibility for identifying and implementing cost-effective projects.

j-Cost of management for regulatory opportunity: Low.

subject	object
bhpRegulatoryOpportunityDriver	"General environmental regulations, including planning."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpDescriptionOfRegulatoryOpportunity	"Energy efficiency opportunity regulations in Australia require operations to investigate energy reduction opportunities an

subject	object
bhpPotentialImpactOfRegulatoryOpportunity	"Reduced operational costs."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpTimeFrameOfRegulatoryOpportunity	"Up to 1 year."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpDirectAndIndirectImpactOfRegulatoryOpportunity	"Direct."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpLikelihoodOfRegulatoryOpportunity	"Likely."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpMagnitudeOfImpactForRegulatoryOpportunity	"Low."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpFinancialImplicationOfRegulatoryOpportunity	"We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy.

subject	object
bhpManagementMethodOfRegulatoryOpportunity	"The Group head office in Melbourne coordinates compliance and reporting on behalf of the Australia Assets, including

subject	object
bhpCostOfManagementForRegulatoryOpportunity	"Low."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.75 'Other Opportunity' class

SPARQL query's answer to CQ75 (a-j)

a-Other opportunity driver: Other drivers.

b- Description of other opportunity: Our diverse portfolio and ability to adapt to changing patterns of energy demand and supply provides an opportunity to attract new investors and drive value for existing shareholders.

c-Potential impact of other opportunity: Investment opportunities.

d-Time frame of oother opportunity: >6 years.

e-Direct and indirect impact of oother opportunity: Direct.

f-Likelihood of oother opportunity: More likely than not.

g-Magnitude of impact for other opportunity: Unknown.

h-Financial implication of other opportunity: We manage risk by remaining financially disciplined within the framework of our differentiated and proven strategy. We take a portfolio approach as the quality and breadth of our business across geography, commodity and market reduces earnings volatility and ensures that our portfolio is robust across a range of scenarios. It would therefore be inappropriate for us to define financial exposure to any one risk in isolation given the mitigation afforded by our balanced and diversified portfolio.

i-Management method of other opportunity: On-going regular dialogue and discussion of climate change risk and opportunities with stakeholders, including investors. Demonstration of our ability to continue to deliver long-term shareholder value.

j-Cost of management for other opportunity: Low.

subject	object
bhpOtherOpportunityDriver	"Other drivers."^^<http://www.w3.org/2001/XMLSchema#string>
bhpDescriptionOfOtherOpportunity	"Our diverse portfolio and ability to adapt to changing patterns of energy demand and supply provides
bhpPotentialImpactOfOtherOpportunity	"Investment opportunities."^^<http://www.w3.org/2001/XMLSchema#string>
bhpTimeFrameOfOtherOpportunity	">6 years."^^<http://www.w3.org/2001/XMLSchema#str
bhpDirectAndIndirectImpactOfOtherOpportunity	"Direct."^^<http://www.w3.org/2001/XMLSchema#string>
bhpLikelihoodOfOtherOpportunity	"More likely than not."^^<http://www.w3.org/2001/XMLSchema#string>
bhpMagnitudeOfImpactForOtherOpportunity	"Unknown."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpFinancialImplicationOfOtherOpportunity	"We manage risk by remaining financially disciplined within the framework of our differentiated and proven
subject	object
bhpManagementMethodOfOtherOpportunity	"On-going regular dialogue and discussion of climate change risk and opportunities
subject	object
bhpCostOfManagementForOtherOpportunity	"Low."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.76 'Separate Fund' class

SPARQL query's answer to CQ76 (a-h)	
a-Scheme liability name: Defined benefit pension schemes.	
b-Extent to which defined benefit pension scheme is estimated: 117.	
c-Fair value of scheme asset to meet defined benefit pension scheme: 1319.	
d-Basis on which that estimates has been arrived: Full actuarial valuations are prepared and updated annually by local actuaries for all schemes. The Projected Unit Credit valuation method is used. The Group operates final salary schemes that provide final salary benefits only, non-salary related schemes that provide flat dollar benefits and mixed benefit schemes that consist of a final salary defined benefit portion and a defined contribution portion.	
e-When that estimate was made: 30th June 2014.	
f- Time scale to achieve full coverage by employer for defined benefit pension scheme: 8 years.	
g-Strategy adopted by employer to work toward full coverage: The Group follows a coordinated strategy for the funding and investment of its defined benefit pension schemes (subject to meeting all local requirements). The Group's aim is for the value of defined benefit scheme assets to be maintained at close to the value of the corresponding benefit obligations, allowing for some short-term volatility.	
h-Measurement unit currency: \$ US million.	
subject	object
bhpSchemeLiabilityName	"Defined benefit pension schemes."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpExtentToWhichDefinedBenefitPensionSchemeIsEstimated	"117."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpFairValueOfSchemeAssetToMeetDefinedBenefitPensionScheme	"1319."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpBasisOnWhichThatEstimateHasBeenArrived	"Full actuarial valuations are prepared and updated annually by local actuaries for all schemes. The F

subject	object
bhpWhenThatEstimateWasMade	"30th June 2014."^^<http://www.w3.org/2001/XMLSchema#string>
bhpTimeScaleToAchieveFullCoverageByEmployerForDefinedBenefitPensionScheme	"8 years."^^<http://www.w3.org/2001/XMLSchema#string>
bhpStrategyAdoptedByEmployerToWorkTowardFullCoverage	"The Group follows a coordinated strategy for the funding and investment of its defined benefit pension schen
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.77 'Defined Contribution Plan' class

SPARQL query's answer to CQ77 (a-b)

a- 467.
b- \$ US million.

subject	object
bhpTotalValueOfDefinedContributionPlan	"467."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.78 'Other Type Of Retirement Benefit' class

SPARQL query's answer to CQ78 (a-d)

a-Other type of retirement benefit name: Post-retirement medical schemes.
b-Extent to which post-retirement medical scheme is estimated: 425.
c-Time scale to achieve full coverage by employer for post- retirement medical scheme: 13 years.
d-Measurement unit currency: \$US million.

subject	object
bhpOtherTypeOfRetirementBenefitName	"Post-retirement medical schemes."^^<http://www.w3.org/2001/XMLSchema#string>
bhpExtentToWhichPostRetirementMedicalSchemeIsEstimated	"425."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpTimeScaleToAchieveFullCoverageByEmployerForPostRetirementMedicalScheme	"13 years."^^<http://www.w3.org/2001/XMLSchema#string>
bhpMeasurementUnitCurrency	"\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.79 'Pension Liability' class

SPARQL query's answer to CQ79 (a-b)	
Total value of pension liability: 542. Measurement unit currency: \$ US million.	
subject	object
bhpTotalValueOfPensionLiability "542"^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
bhpMeasurementUnitCurrency "\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.80 'Liability' class

SPARQL query's answer to CQ80	
Total value of liability: 66031. Measurement unit currency: \$ US million.	
subject	object
bhpTotalValueOfLiability "66031."^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
bhpMeasurementUnitCurrency "\$ US million."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.81 'Percentage Of Senior Management' class

SPARQL query's answer to CQ81	
Percentage Of Senior Management: 0.74	
subject	object
bhpPercentageOfSeniorManagement "0.74"^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.82 'Infrastructure Investment and Service Supported' class

SPARQL query's answer to CQ82	
<p>The Australia Pacific LNG project, in which Origin has a 37.5 per cent interest and is the upstream operator, is the largest project in which the Company is currently involved. It also represents our largest investment in infrastructure and services.</p> <p>At the end of FY 2014, Origin on behalf of Australia Pacific LNG had committed approximately \$124 million in infrastructure and services provided in the upstream region of</p>	

Toowoomba, Western Downs, Banana Shire and Maranoa, including initiatives required as part of conditions of approval of the project's Environmental Impact Statement.

The following table outlines Origin's investments at the end of FY 2014, including their respective value.

Investment	Value	Description
Infrastructure		
Roma Airport Upgrade	\$1,500,000	The Roma airport was upgraded to cater for increasing travel to the region and reduce road traffic, contributing to safer travel.
Miles Aerodrome upgrade	\$20,000,000	Origin on behalf of Australia Pacific LNG upgraded the Miles Aerodrome to enable larger aircraft to land.
Miles water and sewerage upgrade	\$1,290,000	Funding to support the Western Downs Regional Council increase the water and sewerage network capacity in Miles, as part of the Queensland Government Royalties for the Regions program.
Roma sewerage upgrade	\$1,500,000	Funding to support the Maranoa Regional Council to increase capacity of the sewerage treatment facility, enabling private housing development, as part of the Queensland Government Royalties for the Regions program.
Roma Community Hub	\$500,000	The Hub will provide a one-stop-shop for delivery of community services currently provided via different locations, enhancing quality and efficiency of services to the growing population.
Chinchilla Community Kindergarten	\$400,000	This funding contributed to the relocation and expansion of the Chinchilla Community Kindergarten, doubling its capacity for 2014 to meet growing demand.
Miles Affordable Housing Project	\$2,050,000	Program partner, Horizon Housing, completed the development of nine homes in March 2013, which were rented and sold at affordable rates to local residents.
Roma Affordable housing Project	\$1,750,000	Program partner, Horizon Housing, will develop up to 18 affordable dwellings in Roma over two phases, also supported by Maranoa Regional Council.
Miles Trade Training Centre	\$113,000	The Project provided financial support for the fit-out of the Training Centre as part of its workforce and training strategies to enhance industry related skills development.
Queensland Fire & Emergency Services communications enhancement	\$100,000	Installation of communications equipment to enhance "black spots" in the emergency services network across Roma, Injune, Taroom, Wandoan and Mitchell.
Roma Parenting Van	\$95,000	The mobile parenting space provides a clean and safe room for parenting for use at shows and events throughout the Maranoa Region.
Taroom Weed Wash Down Facility	\$400,000	Co-funded with Banana Shire Council the upgrade of the Taroom weed wash down facility aims to prevent the spread of weeds from vehicles.
Road infrastructure agreements	\$90,000,000	Australia Pacific LNG has entered into agreements with local and state governments to upgrade and maintain roads affected by our activities.
Services supported		
CSG School Program (QMEA)	\$250,000	The program aimed to educate high school students about CSG-related engineering opportunities by promoting relevant subjects within the curriculum.
Careers in Gas website	\$40,000	This jointly funded website aims to provide a single portal to advertise jobs in the gas fields region and the CSG/LNG industry.
Housing Case Management	\$150,000	This funded Housing Officers at Murilla Community Centre in Miles and Chinchilla Family Support Centre.
WDRC Town Planning Support	\$260,000	This funded an engineer to work for two years with WDRC to assist with town planning and timely approval of development applications linked to population growth.
Rent Connect Officer	\$65,000	Funding for a Housing Officer to work across Murilla Community Centre Miles and Chinchilla Family Support Centre to address rental affordability issues.
Count Me In (YMCA)	\$200,000	Identifying females in the Surat Basin willing to work but currently outside of the workforce, identifying barriers to employment, and providing targeted training.
I CAN Indigenous schools retention program	Up to \$600,000	An Indigenous school student retention program run across the gas fields in partnership with the community development arm (Titans 4 Tomorrow) of the NRL's Gold Coast franchise.
Rent Subsidy - Miles	\$72,000	A short-term initiative to subsidise rent for participating properties while market rents were impacted by high demand.
Miles Ahead	\$240,000	This program provides support to assist local businesses capitalise on opportunities flowing on from the CSG industry.
REMPAN funding for RDA	\$25,000	The Project provided financial support to Regional Development Australia (RDA) to access REMPLAN data to assist Local Government in forward planning.
Community Support Program	\$225,000	This program provides support to community centres in Miles and Chinchilla to cater for an increased demand in services during the Project's period of peak impact.
Education Qld Schools Program	\$100,000	This jointly funded program aims to build local workforce capacity by enhancing student interest in science, mathematics, engineering and technology in 41 schools across the Surat Basin.
NGO Capacity Building Program	\$188,000	Targeting community centres in Chinchilla, Miles, Dalby and Tara, the program aims to build capacity in the areas of governance and funding sustainability.
Community Skills Scholarship (CSS)	\$1,800,000 committed to December 2013	CSS provides up to \$13,500 to apprentices within the gas fields region to help them complete their apprenticeships locally.
CARS (Caring About Road Safety)	\$160,000 to December 2013	Developed in response to local concerns and delivered in partnership with the RACQ, the CARS program equips new drivers with safe driving strategies.
subject	object	
orgExtentOfDevelopmentOfInfrastructureInvestmentAndServiceSupported "The Australia Pacific LNG project, in which Origin has a 37.5 per cent interest and is the upstream		

Table B.83 ‘Community and Local Economy’ class

SPARQL query’s answer to CQ83	
The details of ‘Community and Local Economy’ class are listed in above table on the first column at left side.	
subject	object
orgNameOfCommunityAndLocalEconomy	"Infrastructure: Roma Airport Upgrade, Miles Aerodrome upgrade, Miles water and sewerage

Table B.84 ‘Percentage Of Procurement Budget Spent On Local Supplier’ class

SPARQL query’s answer to CQ84	
Percentage of product and service purchased locally:55%	
Organization geographic definition for local purchase: Local spend refers to spend within the communities in which we operate.	
subject	object
bhpPercentageOfProductAndServicePurchasedLocally	"55%"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpOrganizationGeographicDefinitionForLocalPurchase	"Local spend refers to spend within the communities in which we operate."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.85 ‘Location Of Operation’ class

SPARQL query’s answer to CQ85	
Definition used for significant location of operation for local purchase: Largest local spends made by operations in the United States and Australia, 72 % and 66 % respectively.	
subject	object
bhpDefinitionUsedForSignificantLocationOfOperationForLocalPurchase	"Largest local spends made by operations in the United States and Australia, 72% and 66 % respectively."^^<h

Table B.86 ‘Material Used’ class/ EN1

SPARQL query’s answer to CQ86	
Total weight of raw material used: 2.3.	
Raw material used source: Renewable sources.	
Raw material used purchased from supplier: External Supplier.	
Measurement unit of material used: Million tonne.	
subject	object
amcTotalWeightOfRawMaterialUsed	"2.3."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
amcRawMaterialUsedSource	"Renewable sources."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
amcRawMaterialUsedPurchasedSupplier	"External Supplier."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
amcMeasurementUnitOfMaterialUsed	"Million tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.87 'Recycled Input Material Used' class

SPARQL query's answer to CQ87

a- Total recycled input material used: 46000.
Measurement unit of total recycled input material used: tonne.

subject	object
amcTotalRecycledInputMaterialUsed	"46000"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
amcMeasurementUnitOfTotalRecycledInputMaterialUsed	"tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.88 'Percentage Of Recycled Input Material Used' class

SPARQL query's answer to CQ88

Percentage of recycled input materials used: 2%.

subject	object
amcPercentageOfRecycledInputMaterialUsed	"2%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.89 'Energy Consumption'

SPARQL query's answer to CQ89

Total energy consumption: 343.
Measurement unit of energy consumption: Petajoules.

subject	object
bhpTotalEnergyConsumption	"343."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpMeasurementUnitOfEnergyConsumption	"Petajoules."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.90 'Non Renewable Fuel Consumed' class

SPARQL query's answer to CQ90	
Total fuel consumption from non-renewable source: 197.	
Measurement unit of fuel consumption from non-renewable source: Petajoules.	
subject	object
bhpTotalFuelConsumptionFromNonRenewableSource	"197."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfEnergyConsumption	"Petajoules."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.91 'Electricity Consumption' class

SPARQL query's answer to CQ91	
Total electricity consumption: 119.	
Measurement unit of electricity consumption: PetaJoules.	
subject	object
bhpTotalElectricityConsumption	"119."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfElectricityConsumption	"PetaJoules."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.92 'Process Redesign Initiative' class

SPARQL query's answer CQ92	
Amount of reduction of energy consumption achieved: 500.	
Measurement unit for reduction of energy consumption: Tonne.	
subject	object
bhpAmountOfReductionOfEnergyConsumptionAchievedAsResultOfProcessRedesignInitiative	"500."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitForReductionOfEnergyConsumption	"tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.93 'Reduction In Energy Requirement' class

SPARQL query's answer to CQ93	
Reduction in energy requirement of sold product and service achieved: 1.6.	
Measurement unit of reduction in energy requirement of sold product and service achieved: Megawatt hours per tonne (MWh/tonne).	
subject	object
bhpReductionInEnergyRequirementOfSoldProductAndServiceAchieved "1.6."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
bhpMeasurementUnitOfReductionInEnergyRequirementOfSoldProductAndServiceAchieved "Megawatt hours per tonne (MWh/tonne)."	

Table B.94 'Sold Product' class

SPARQL query's answer to CQ94	
Sold product definition: At our Manganese South Africa Asset, an opportunity was identified to simplify the Business by replacing five open furnaces at the Metalloys South Plant operation with a more energy efficient closed furnace. The new furnace is significantly less energy-intensive, reducing plant energy consumption from 4.1 megawatt hours per tonne (MWh/tonne) to 2.5 MWh/tonne. This is generating approximately 25 megawatts of electricity at Metalloys, reducing our demand on an already constrained electricity grid.	
subject	object
bhpSoldProductDefinition "At our Manganese South Africa Asset, an opportunity was identified to simplify the Business by replacing five	

Table B.95 'Water Withdrawal' class

SPARQL query's answer to CQ95	
Total volume of water withdrawn: 2,451,202.	
Measurement unit of water withdrawn: ML.	
subject	object
orgTotalVolumeOfWaterWithdrawn "2,451,202."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
orgMeasurementUnitOfWaterWithdrawn "ML."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.96 'Water Withdrawal By Surface Water Source' class

SPARQL query's answer to CQ96	
Total volume of water withdrawn from surface water source: 2,441,281.	
subject	object
orgTotalVolumeOfWaterWithdrawnFromSurfaceWaterSource "2,441,281."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.97 'Water Withdrawal By Ground Water Source' class

SPARQL query's answer to CQ97	
Total volume of water withdrawn from ground water source: 7,675.	
subject	object
orgTotalVolumeOfWaterWithdrawnFromGroundWaterSource	"7,675."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.98 'Water Withdrawal By Rainwater Collected Directly and Stored By Org Source' class

SPARQL query's answer to CQ98	
Total volume of water withdrawn from rainwater source: 672.	
subject	object
orgTotalVolumeOfWaterWithdrawnFromRainWaterSource	"672."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.99 'Water Withdrawal By Waste Water From Another Org Water Source' class

SPARQL query's answer to CQ99	
Total volume of water withdrawn from waste water source: 3.	
subject	object
orgTotalVolumeOfWaterWithdrawnFromWasteWaterSource	"3."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.100 'Water Withdrawal By Municipal Water Supply Or Other Water Utility' class

SPARQL query's answer to CQ100	
Total volume of water withdrawn from mmunicipal water source: 1571.	
subject	object
orgTotalVolumeOfWaterWithdrawnFromMunicipalWaterSource	"1,571."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.101 'Methodology Used EN8'

SPARQL query's answer to CQ101	
Methodology used for EN8: Methodologies include the use of calibrated instrumentation, derivations from mass balances and engineering calculations, as well as relevant estimation techniques. Some parameters may also be measured by appropriately qualified external third party service provides such as certified laboratories.	
subject	object
orgMethodologyUsedEN8	"Methodologies include the use of calibrated instrumentation, derivations from mass balances and engineering calculations, as well as relevant estimation techniques."

Table B.102 'Water Source Affected' class

SPARQL query's answer to CQ102	
<p>a- Water source affected by water withdrawal by size: Origin water withdrawals do not significantly affect water systems by volume.</p> <p>b-Is water source designated as protected area:Yes.</p> <p>c-Biodiversity value of water source: Origin water withdrawals do not significantly impact biodiversity values.</p> <p>d-Value of water source to local community: The water we use though is important to local communities and we aim to minimise any impacts on other users of water.</p>	
subject	object
orgWaterSourceAffectedByWaterWithdrawalBySize "Origin water withdrawals do not significantly affect water systems by volume."^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
orgIsWaterSourceDesignatedAsPotectedArea "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
subject	object
orgBiodiversityValueOfWaterSource "Origin water withdrawals do not significantly impact biodiversity	
subject	object
orgValueOfWaterSourceToLocalCommunity "The water we use though is important to local communities and we aim to minimise any impacts on other users of	

Table B.103 'Methodology Used EN9' class

SPARQL query's answer to CQ103	
<p>Methodology used for EN9: Methodologies include the use of calibrated instrumentation, derivations from mass balances and engineering calculations, as well as relevant estimation techniques. Some parameters may also be measured by appropriately qualified external third party service provides such as certified laboratories.</p>	
subject	object
orgMethodologyUsedEN9 "Methodologies include the use of calibrated instrumentation, derivations from mass balances and engineering calculations, as well as relevant estimation techniques.	

Table B.104 'Water Recycled and Reused' class

SPARQL query's answer to CQ104	
<p>Total volume of water recycled and reused: 2,823.</p> <p>Measurement unit of water recycled and reused: ML.</p>	
subject	object
orgTotalVolumeOfWaterRecycledAndReused "2,823."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
orgMeasurementUnitOfWaterRecycledAndReused "ML."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.105 'Percentage Of Water Recycled and Reused' class

SPARQL query's answer to CQ105	
Recycled and reused water as percentage of total water withdrawn: 31%.	
subject	object
orgRecycledAndReusedWaterAsPercentageOfTotalWaterWithdrawn	"31%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.106 'Methodology Used EN10' class

SPARQL query's answer to CQ106	
Methodologies include the use of calibrated instrumentation, derivations from mass balances and engineering calculations, as well as relevant estimation techniques. Some parameters may also be measured by appropriately qualified external third party service provides such as certified laboratories.	
subject	object
orgMethodologyUsedEN10	Methodologies include the use of calibrated instrumentation, derivations from mass balances and engineering calculations, as well as relevant estimation techniques.

Table B.107 'Operational Site' class

SPARQL query's answer to CQ107	
Total size of operational site: 8593900.	
Measurement unit of operational site size: Hectares.	
subject	object
bhpTotalSizeOfOperationalSite	"8593900."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfOperationalSiteSize	"Hectares."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.108 'Operational Site Adjacent To' class

SPARQL query's answer to CQ108	
Operational site name: Beharra Springs.	
Operational site location: Western Australia, Australia.	
Protected area or high biodiversity value area: Adjacent to Yandanogo Nature Reserve.	
subject	object
orgOperationalSiteName	"Beharra Springs."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
orgOperationalSiteLocation	"Western Australia, Australia."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
orgProtectedAreaOrHighBiodiversityValueArea	"Adjacent to Yardanogo Nature Reserve."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.109 'Operational Site Owned Leased Managed In' class

SPARQL query's answer to CQ109	
Size of operational site owned leased or managed in: 8410000.	
subject	object
bhpSizeOfOperationalSiteOwnedLeasedOrManagedIn	"8410000."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.110 'Operational Site Area Of High Biodiversity Value Outside Protected' class

SPARQL query's answer to CQ110	
Size of operational site disturbed: 145000.	
Size of operational site rehabilitated: 38900.	
subject	object
bhpSizeOfOperationalSiteDisturbed	"145000."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpSizeOfOperationalSiteRehabilitated	"38900."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.111 'Impact On Biodiversity' class

SPARQL query's answer to CQ 111(a-b)	
a-Nature of significant impact on biodiversity: Packaging contributes to pollution that impacts a wide range of species, including but not limited to; birds, mammals, invertebrates and fish.	
b-Specie affected, extent of area impacted duration and reversibility of significant impact on biodiversity: These impacts are global in scale and vary in terms of their duration and their reversibility.	
subject	object
amcNatureOfSignificantImpactOnBiodiversity	"Packaging contributes to pollution that impacts a wide range of species, including but not limited to; birds, mammals, invertebrates and
subject	object
amcSpecieAffectedExtentOfAreaImpactedDurationAndReversibilityOfSignificantImpactOnBiodiversity	"These impacts are global in scale and vary in terms of their duration and their reversibility."^^<

Table B.112 ‘Activity Product and Service’ class

SPARQL query’s answer to CQ112	
Name of activity product and service: Packaging.	
subject	object
amcActivityProductAndServiceName	"Packaging."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.113 ‘All Habitat Protected Area Or Restored Area’ class

SPARQL query’s answer to CQ113(a-h)	
a-Designated protected area name: Terrestrial and Maritime.	
b-Terrestrial designated protected area by size and continent: Africa 0, Australia 29000, North America 1380, South America 0.	
c-Maritime designated protected area by size and continent: Australia 68.	
d-Measurement unit of all habitat protected area or restored area: Hectares.	
e-Number of area adjacent to land managed for Terrestrial designated protected area by continent: Africa 1, Australia 7, North America 1, and South America 1.	
Number of area adjacent to land managed for Maritime designated protected area by continent: Australia 3.	
Number of area on land managed for Terrestrial designated protected area by continent: Africa 0, Australia 3, North America 3, and South America 0.	
Number of area on land managed for Maritime designated protected area by continent: Australia 1.	
subject	object
bhpDesignatedProtectedAreaName	"Terrestrial and Maritime."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpTerrestrialDesignatedProtectedAreaBySizeAndContinent	"Africa 0, Australia 29,000 North America 1,380 SouthAmerica 0"^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpMaritimeDesignatedProtectedAreaBySizeAndContinent	"Australia 68."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpMeasurementUnitOfAllHabitatProtectedAreaOrRestoredArea	"Hectares."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpNumberOfAreaAdjacentToLandManagedForTerrestrialDesignatedProtectedAreaByContinent	"Africa 1 Australia 7 NorthAmerica 1 South America 1"^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpNumberOfAreaAdjacentToLandManagedForMaritimeDesignatedProtectedAreaByContinent	"Australia 3."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpNumberOfAreaOnLandManagedForTerrestrialDesignatedProtectedAreaByContinent	"Africa 0 Australia 3 North America 3 South America 0"^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpNumberOfAreaOnLandManagedForMaritimeDesignatedProtectedAreaByContinent	"Australia 1."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.114 ‘Operational Site Adjacent To’ class

SPARQL query’s answer to CQ 114	
Name and location of operational site: Australia Pacific LNG project in Queensland, Australia.	
subject	object
orgOperationalSiteNameAndLocation	"Australia Pacific LNG project in Queensland, Australia."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.115 ‘Specie On IUCN Red List Of Threatened Specie’ class

SPARQL query’s answer to CQ115 (a-d)	
a-Total number of specie on IUCN Red List of threatened species: 147.	
b-Name of specie on IUCN Red List of threatened species: Rutidosis lanata, Eleocharis blakeana and Acacia tenuinervis.	
c-Level of extinction risk vulnerable: Rutidosis lanata reclassified from endangered to vulnerable.	
d-Level of extinction risk least concern: Eleocharis blakeana and Acacia tenuinervis reclassified from near-threatened to least concern.	
subject	object
orgTotalNumberOfSpecieOnIUCNRedListOfThreatenedSpecie	"147."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgNameOfSpecieOnIUCNRedListOfThreatenedSpecie	"Rutidosis lanata, Eleocharis blakeana and Acacia tenuinervis."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
orgLevelOfExtinctionRiskVulnerable	"Rutidosis lanata reclassified from endangered to vulnerable."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
orgLevelOfExtinctionRiskLeastConcern	"Eleocharis blakeana and Acacia tenuinervis reclassified from near-threatened to least concern."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.116 ‘Specie On National Conservation Or Regional Conservation List’ class

SPARQL query’s answer to CQ 116 (a-b)	
a-Total number of species on national conservation or regional conservation list: 100.	
b-Name of species on national conservation or regional conservation list: Boggomoss Snail (Adclarkia dawsonensis) and Dulacca Woodland Snail (Adclarkia dulacca).	
subject	object
orgTotalNumberOfSpecieOnNationalConservationOrRegionalConservationList	"100."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgNameOfSpecieOnNationalConservationOrRegionalConservationList	"Boggomoss Snail (Adclarkia dawsonensis) and Dulacca Woodland Snail (Adclarkia dulacca)."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.117 ‘Gross Direct GHG Emission Scope1’ class

SPARQL query’s answer to CQ117 (a-b)	
a-Gross direct GHG emission Scope1: 22.7.	
b-Measurement unit: Millions of tonne CO2-e.	
subject	object
bhpGrossDirectGHGEmissionScope1 "22.7."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
bhpMeasurementUnitOfGreenHouseGasGHGEmissionScope1Scope2Scope3 "Million of tonne CO2-e."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.118 ‘Chosen Baseline’ class

SPARQL query’s answer to CQ118	
Financial baseline year: FY2006.	
subject	object
bhpFinancialBaselineYear "FY2006."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.119 ‘Source Of Emission Factor Used and Global Warming Potential GWP Rate Or Reference To GWP Source’ class

SPARQL query’s answer to CQ119	
Reference to Global Warming Potential GWP source: Measured according to the World Resources Institute/World Business Council World Business Council for Sustainable Development Greenhouse Gas Protocol.	
subject	object
bhpReferenceToGlobalWarmingPotentialGWPSource "Measured according to the World Resources Institute/World Business Council World Business Council for Sustainable Development	

Table B.120 ‘Gross Energy Indirect GHG Emission Scope2’ class

SPARQL query’s answer to CQ120 (a-b)	
a-Gross energy indirect GHG emission Scope2: 22.3.	
b-Measurement unit: Millions of tonne CO2-e.	
subject	object
bhpGrossEnergyIndirectGHGEmissionScope2 "22.3."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
bhpMeasurementUnitOfGreenHouseGasGHGEmissionScope1Scope2Scope3 "Million of tonne CO2-e."^^<http://www.w3.org/2001/XMLSchema#string>	

Table B.121 ‘Gross Other Indirect GHG Emission Scope3’ class

SPARQL query’s answer to CQ 121(a-c)	
a-Gross GHG emission Scope3 use of sold product coal product: 297.	
b-Gross GHG emission Scope3 use of sold product petroleum product: 93.	
c-Measurement unit: Millions of tonne CO2-e.	
subject	object
bhpGrossGHGEmissionScope3UseOfSoldProductCoalProduct	"297"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpGrossGHGEmissionScope3UseOfSoldProductPetroleumProduct	"93"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfGreenHouseGasGHGEmissionScope1Scope2Scope3	"Million of tonne CO2-e."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.122 ‘Greenhouse Gas GHG Emission Intensity Ratio’ class

SPARQL query’s answer to CQ 122(a-b)	
a-Greenhouse gas GHG emission intensity ratio: 4.9.	
b-Measurement unit of greenhouse gas GHG emission intensity ratio: Tonne of CO2-e per tonne of copper equivalent production.	
subject	object
bhpGreenhouseGasGHGEmissionIntensityRatio	"4.9"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfGreenhouseGasGHGEmissionIntensityRatio	"tonne of CO2-e per tonne of copper equivalent production."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.123 ‘Org Specific Metric For GHG Emission Intensity Ratio’ class

SPARQL query’s answer to CQ 123	
Product emission intensity: Copper equivalent production.	
subject	object
bhpProductEmissionIntensity	"copper equivalent production."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.124 ‘Process Redesign’ class

SPARQL query’s answer to CQ 124(a-b)	
a-Amount of GHG reduction achieved: 1.7.	
b-Measurement unit of amount of GHG reduction achieved: MtCO2-e.	
subject	object
bhpAmountOfGHGReductionAchieved	"1.7."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfAmountOfGHGReductionAchieved	"MtCO2-e."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.125 'Chosen Base Year' class

SPARQL query's answer to CQ 125	
Financial base year: FY2013.	
subject	object
bhpFinancialBaseYear	"FY2013."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.126 'Substance' class

SPARQL query's answer to CQ 126 (a-b)	
a-Total emission of ozone depleting substance: 2.2.	
b- Measurement unit of emission of ozone depleting substance ODS: Tonne.	
subject	object
bhpTotalEmissionOfOzoneDepletingSubstance	"2.2."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfEmissionOfOzoneDepletingSubstanceODS	"tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.127 'Emission Identified In Relevant Regulation' class

SPARQL query's answer to CQ127 (a-d)	
a-Amount of NO ₂ air emission: 83800.	
b-Amount of SO ₂ air emission: 53500.	
c-Amount of other air emission: 1140.	
d- Measurement unit of NO ₂ , SO ₂ , and other significant emission: Tonne.	
subject	object
bhpAmountOfNO2AirEmission	"83800"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpAmountOfSO2AirEmission	"53500."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpAmountOfOtherAirEmission	"1140."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfNO2SO2AndOtherSignificantEmission	"tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.128 ‘Water Discharge’ class

SPARQL query’s answer to CQ128 (a-g)	
a-Total volume of water discharge: 2,445,717.2.	
b-Total volume of water discharge by destination to offsite municipal treatment plant: 66.6.	
c-Total volume of water discharge by destination to ground water: 323.0.	
d-Total volume of water discharge by destination to ocean: 32.9.	
e-Total volume of water discharge by destination to surface water/Wetland/River/Lake: 2,441,741.2.	
f-Total volume of water discharge by destination to other: 3,553.5.	
g- Measurement unit of water discharge: Mega liter (ML).	
subject	object
orgTotalVolumeOfWaterDischarge	"2,445,717.2"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgTotalVolumeOfWaterDischargeByDestinationToOffsiteMunicipalTreatmentPlant	"66.6"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgTotalVolumeOfWaterDischargeByDestinationToGroundWater	"323.0"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgTotalVolumeOfWaterDischargeByDestinationToOcean	"32.9"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgTotalVolumeOfWaterDischargeByDestinationToSurfaceWaterWetlandRiverLake	"2,441,741.2"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgTotalVolumeOfWaterDischargeByDestinationToOther	"3,553.5"^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgMeasurementUnitOfWaterDischarge	"Mega liter (ML)."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.129 ‘Waste Type’ class, ‘Hazardous Waste’ class and ‘Non Hazardous Waste’ class

SPARQL query’s answer to CQ129 (a-c)	
a-Total weight of hazardous waste-mineral: 35600.	
b-Total weight of non-hazardous waste mineral-tailing: 154000.	
c-Measurement unit of waste type: Kilo tonne.	
subject	object
bhpTotalWeightOfHazardousWasteMineral	"35600"^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpTotalWeightOfNonHazardousWasteMineralTailing	"154000."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfWasteType	"Kilo tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.130 ‘Waste Disposal Recycling Method’ class and ‘Waste Disposal On Site Storage Method’ class

SPARQL query’s answer to CQ130 (a-c)	
a-Total weight of waste disposal recycling method: 85.	
b-Total weight of waste disposal on site storage method: 47.	
c-Measurement unit of waste disposal method: Kilo tonne.	
subject	object
bhpTotalWeightOfWasteDisposalRecyclingMethod	"85."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpTotalWeightOfWasteDisposalOnSiteStorageMethod	"47."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitOfWasteDisposalMethod	"Kilo tonne."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.131 ‘Significant Spill’ class

SPARQL query’s answer to CQ131(a-b)	
a-Total volume of significant spill: 25000.	
b-Measurement unit of significant spill: Liters.	
subject	object
orgTotalVolumeOfSignificantSpill	"25000."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgMeasurementUnitOfSignificantSpill	"liters."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.132 ‘Recorded Significant Spill’ class

SPARQL query’s answer to CQ132 (a-d)	
<p>a-Volume of Recorded Significant Spill: 25000.</p> <p>b-Measurement unit of Recorded Significant Spill: Liters.</p> <p>c-Material of Recorded Significant Spill: Well water.</p> <p>d-Impact of Recorded Significant Spill: It involved the loss of integrity of a flare pit during work on a well resulting in the loss of the produced water. Approximately 25,000 liters of the produced water was released and a small proportion entered a nearby waterway.</p>	
subject	object
orgMeasurementUnitOfSignificantSpill "liters."^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
orgVolumeOfRecordedSignificantSpill "25000."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
orgMaterialOfRecordedSignificantSpill "well water."^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
orgImpactOfRecordedSignificantSpill "It involved the loss of integrity of a flare pit during work on a well resulting in the loss of the produced water."	

Table B.133 ‘Product and Service Group’ class

SPARQL query’s answer to CQ 133	
<p>Specific initiative undertaken: Through our membership of the International Council on Mining and Metals (ICMM).</p> <p>Through our management systems and internal audit processes.</p> <p>In FY2014, we engaged in a number of product stewardship initiatives, including with the International Manganese Institute, Steel Stewardship Forum, International Aluminium Institute and the Australian Petroleum Production and Exploration Association.</p> <p>Under the International Maritime Solid Bulk Cargoes Code.</p> <p>Furthermore, we are documenting a moisture management plan.</p> <p>As a member of the World Nuclear Association, we follow their uranium product stewardship principles.</p> <p>Our product stewardship activities range from participating in national and international stewardship programs to allowing our customers to audit our HSEC activities.</p> <p>A number of our coal operations have participated in product stewardship initiatives, including internal and external audits of the HSEC activities undertaken by our operations and through the provision of ongoing technical assistance to our customers to better understand the properties of our products, including how they can be used more efficiently.</p> <p>As a member of the World Coal Association, we work with the industry to proactively manage product stewardship issues, including forthcoming requirements of the International Maritime Organization International Convention for the prevention of pollution from ships.</p>	
subject	object
bhpSpecificInitiativeUndertaken "Through our membership of the International Council on Mining and Metals (ICMM). Through our management systems and internal audit processes."	

Table B.134 'International Declaration Convention Treaty and National Sub National Regional and Local Regulation' class

SPARQL query's answer to CQ 134(a-d)	
<p>a-Total number of non-monetary sanction for failure to comply with environmental law and regulation: 9.</p> <p>b-Total monetary value of significant fine for failure to comply with environmental law and regulation: 128898.</p> <p>c-Measurement unit of significant fine for failure to comply with environmental law and regulation: \$ US.</p> <p>d-Description of regional environmental fine levied: A fine of US\$94,455 was levied at Energy Coal South Africa's Khutala Colliery, which self-reported a non-compliance against its environmental impact assessment requirements defined by the National Environmental Management Act. As a result, the</p> <p style="padding-left: 40px;">asset has appointed an independent Environmental Control Officer and introduced a strengthened land disturbance permit procedure.</p> <p style="padding-left: 40px;">NSW Energy Coal incurred three fines totaling US\$6,971 at its Mt Arthur Operations for blasting penalty infringements outside the manufacturer's recommended sleep time, failure to comply with the approved erosion and sediment control plan and carrying out dumping operations on an elevated and exposed area during adverse weather conditions. Actions are in place to prevent these infringements occurring again.</p> <p style="padding-left: 40px;">The five other fines, totalling US\$27,472, were levied in North and South America, where our operations were cited for activities in relation to regulatory breaches against permit requirements and for loss of containment. The impacted assets are reviewing measures to prevent these incidents from occurring in the future.</p>	
subject	object
bhpTotalNumberOfNonMonetarySanctionForFailureToComplyWithEnvironmentallLawAndRegulation "9."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
bhpTotalMonetaryValueOfSignificantFineForFailureToComplyWithEnvironmentalLawAndRegulation "128898."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
bhpMeasurementUnitOfSignificantFineForFailureToComplyWithEnvironmentalLawAndRegulation "\$ US."^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
bhpDescriptionOfRegionalEnvironmentalFineLevied "A fine of US\$94,455 was levied at Energy Coal South Africa's Khutala Colliery, which self-reported a non-compliance against	

Table B.135 'Total Number Of New Supplier Contracting With Org' class

SPARQL query's answer to CQ 135	
Total number of new suppliers that were contracting with organization: 13.	
subject	object
bhpTotalNumberOfNewSupplierContractingWithOrg "13."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.136 ‘Grievance About Environmental Impact Filed’ class

SPARQL query’s answer to CQ136 (a-b)	
<p>a-Nature, location, and party of grievance filed about environmental impact: Many of our operations are located in rural and regional areas and involve construction and operation of large-scale infrastructure such as gas processing facilities, pipelines and power stations, as well as smaller scale infrastructure such as CSG gas wells.</p> <p>The scale of our operations affects neighboring communities – sometimes positively and sometimes in ways that create challenges requiring careful management. People living near our operations can be affected by increases in traffic, noise and dust. They may also be affected by socio-economic factors resulting from our presence, such as increased housing costs and competition for labor. Origin must manage these issues sensitively and acknowledge the loss of control and power people in the community may feel as a result of our large-scale infrastructure projects. On every project, we listen to people living near our operations to address community concerns, respond to identified community needs and take action to mitigate the impact of our operations.</p> <p>Our Community Directive guides how we interact with local communities manage impacts and contribute to development.</p>	
b-Total number of grievance filed about environmental impact: 127.	
subject	object
orgNatureLocationAndPartyOfGrievanceFiledAboutEnvironmentalImpact "Many of our operations are located in rural and regional areas and	
subject	object
orgTotalNumberOfGrievanceFiledAboutEnvironmentalImpact "127."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.137 ‘Grievance About Environmental Impact Addressed’ class

SPARQL query’s answer to CQ137	
Total number of grievance addressed about environmental impact: 127.	
subject	object
orgTotalNumberOfGrievanceAddressedAboutEnvironmentalImpact "127."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.138 ‘Grievance About Environmental Impact Resolved’ class

SPARQL query’s answer to CQ138	
Total number of grievance resolved about environmental impact: 127.	
subject	object
orgTotalNumberOfGrievanceResolvedAboutEnvironmentalImpact "127."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.139 'New Employee Hire By Age Group' class

SPARQL query's answer to CQ139 (a-d)	
a-Total number and rate of new employee hire: 180, 29.1%.	
b-Total number and rate of new employee hire by age group under 30 years old: 40, 6.5%.	
c-Total number and rate of new employee hire by age group 30 to 50 years old: 116, 18.7%.	
d-Total number and rate of new employee hire by age group over 50 years old: 24, 3.9%.	
subject	object
tdTotalNumberAndRateOfNewEmployeeHire "180, 29.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdTotalNumberAndRateOfNewEmployeeHireByAgeGroupUnder30YearOld "40, 6.5%."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdTotalNumberAndRateOfNewEmployeeHireByAgeGroup30To50YearOld "116, 18.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdTotalNumberAndRateOfNewEmployeeHireByAgeGroupOver50YearOld "24, 3.9%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.140 'New Employee Hire By Gender' class

SPARQL query's answer to CQ 140 (a-b)	
a-Total number and rate of new employee hire by female: 77, 12.4%.	
b-Total number and rate of new employee hire by male: 103, 16.6%.	
subject	object
tdTotalNumberAndRateOfNewEmployeeHireByFemale "77, 12.4%."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdTotalNumberAndRateOfNewEmployeeHireByMale "103, 16.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.141 'New Employee Hire By Region' class

SPARQL query's answer to CQ 141 (a-b)	
a-Name of region for total number and rate of new employee hire: VIC, NSW, QLD, and USA.	
b1- Total number and rate of new employee hire by VIC region: 96, 15.5%.	
b2- Total number and rate of new employee hire by NSW region: 65, 10.5%.	
b3- Total number and rate of new employee hire by QLD region: 3, 0.5%.	
b4- Total number and rate of new employee hire by USA region: 16, 2.6%.	

subject	object
tdNameOfRegionForTotalNumberAndRateOfNewEmployeeHire	"VIC, NSW, QLD, and USA."^^<http://www.w3.org/2001/XMLSchema#string>
tdTotalNumberAndRateOfNewEmployeeHireByNSWRegion	"65, 10.5%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberAndRateOfNewEmployeeHireByQLDRegion	"3, 0.5%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberAndRateOfNewEmployeeHireByUSARegion	"16, 2.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberAndRateOfNewEmployeeHireByVICRegion	"96, 15.5%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.142 'Employee Turnover By Age Group' class

SPARQL query's answer to CQ142(a-d)	
a-Total number and rate of employee turnover: 100, 18.2%.	
b-Total number and rate of employee turnover by age group under 30 years old: 9, 1.7%.	
c-Total number and rate of employee turnover by age group 30 to 50 years old: 63, 11.4%.	
d-Total number and rate of employee turnover by age group over 50 years old: 28, 5.1%.	
subject	object
tdTotalNumberAndRateOfEmployeeTurnover	"100, 18.2%."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
tdTotalNumberAndRateOfEmployeeTurnoverByAgeGroupUnder30YearOld	"9, 1.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
tdTotalNumberAndRateOfEmployeeTurnoverByAgeGroup30To50YearOld	"63, 11.4%."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
tdTotalNumberAndRateOfEmployeeTurnoverByAgeGroupOver50YearOld	"28, 5.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.143 'Employee Turnover By Gender' class

SPARQL query's answer to CQ143 (a-b)	
a-Total number and rate of employee turnover by female: 57, 10.4%.	
b-Total number and rate of employee turnover by male: 43, 7.8%.	
subject	object
tdTotalNumberAndRateOfEmployeeTurnoverByFemale	"57, 10.4%."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
tdTotalNumberAndRateOfEmployeeTurnoverByMale	"43, 7.8%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.144 ‘Employee Turnover By Region’ class

SPARQL query’s answer to CQ 144(a-b)	
a-Name of region for total number and rate of employee turnover: VIC, NSW, and USA.	
b1-1 Total number and rate of employee turnover by VIC region: 67, 12.2%.	
b2- Total number and rate of employee turnover by NSW region: 19, 3.4%.	
b3- Total number and rate of employee turnover by USA region: 14, 2.6%.	
subject	object
tdNameOfRegionForTotalNumberAndRateOfEmployeeTurnover "VIC, NSW, and USA."^^<http://www.w3.org/2001/XMLSchema#string>	
subject	object
tdTotalNumberAndRateOfEmployeeTurnoverByNSWRegion "19, 3.4%."^^<http://www.w3.org/2001/XMLSchema#decimal>	
tdTotalNumberAndRateOfEmployeeTurnoverByUSARegion "14, 2.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>	
tdTotalNumberAndRateOfEmployeeTurnoverByVICRegion "67, 12.2%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.145 ‘Standard Benefit To Full Time Employee’ class

SPARQL query’s answer to CQ145	
Standard benefit to full time employee: Origin has a universal service threshold of 12 months service for the Employee Share Plan, and insured benefits such as Salary Continuance and Life Insurance carry an insurer’s requirement for a minimum of 15 hours per week employment in order to maintain insurance cover and do not cover casual employment. Casual employment does not carry leave entitlements and a salary loading is paid in lieu of those entitlements. The Company does not have Health Care benefits except as provided under the Travel Insurance covers for employees travelling on company business. Superannuation is an employee choice regime where the employee chooses their provider and laws cover some minimum insurance covers that superannuation funds are obliged to offer, but in addition to those the Company provides Salary Continuance (Income Protection) and Death and Disablement covers subject to the insurer’s requirements above.	
subject	object
orgStandardBenefitToFullTimeEmployee "Origin has a universal service threshold of 12 months service for the Employee Share Plan, and insured benefits	

Table B.146 ‘Employee Entitled To Parental Leave’ class

SPARQL query’s answer to CQ146 (a-b)	
a-Total number of employee entitled to parental leave: 502.	
b-Total number of employee entitled to parental leave by female and male: 258, 244.	
subject	object
tdTotalNumberOfEmployeeEntitledToParentalLeave "502."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdTotalNumberOfEmployeeEntitledToParentalLeaveByFemaleMale "258, 244."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.147 ‘Employee Taken Parental Leave’ class

SPARQL query’s answer to CQ147 (a-b)			
a-Total number of employees that took parental leave: 45.			
b-Total number of employees that took parental leave by female and male: 27, 18.			
subject	object		
<table border="1"> <tr> <td>tdTotalNumberOfEmployeeTakenParentalLeave</td> <td>"45."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </table>		tdTotalNumberOfEmployeeTakenParentalLeave	"45."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfEmployeeTakenParentalLeave	"45."^^<http://www.w3.org/2001/XMLSchema#decimal>		
subject	object		
<table border="1"> <tr> <td>tdTotalNumberOfEmployeeTakenParentalLeaveByFemaleMale</td> <td>"27, 18."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </table>		tdTotalNumberOfEmployeeTakenParentalLeaveByFemaleMale	"27, 18."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfEmployeeTakenParentalLeaveByFemaleMale	"27, 18."^^<http://www.w3.org/2001/XMLSchema#decimal>		

Table B.148 ‘Employee Returned To Work After Parental Leave Ended’ class

SPARQL query’s answer to CQ148 (a-b)			
a-Total number of employees who returned to work after parental leave ended: 30.			
b-Total number of employees who returned to work after parental leave ended by female and male: 12, 18.			
subject	object		
<table border="1"> <tr> <td>tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEnded</td> <td>"30."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </table>		tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEnded	"30."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEnded	"30."^^<http://www.w3.org/2001/XMLSchema#decimal>		
subject	object		
<table border="1"> <tr> <td>tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedByFemaleMale</td> <td>"12, 18."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </table>		tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedByFemaleMale	"12, 18."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedByFemaleMale	"12, 18."^^<http://www.w3.org/2001/XMLSchema#decimal>		

Table B.149 ‘Employee Returned To Work After Parental Leave Ended Who Still Employed Twelve Month After Return To Work’ class

SPARQL query’s answer to CQ149 (a-b)			
a-Total number of employees who returned to work after parental leave ended who were still employed twelve months after their return to work: 35.			
b-Total number of employees who returned to work after parental leave ended who were still employed twelve months after their return to work by female and male: 18, 17.			
subject	object		
<table border="1"> <tr> <td>tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveMonthAfterReturnToWork</td> <td>"35."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </table>		tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveMonthAfterReturnToWork	"35."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveMonthAfterReturnToWork	"35."^^<http://www.w3.org/2001/XMLSchema#decimal>		
subject	object		
<table border="1"> <tr> <td>tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveMonthAfterReturnToWorkByFemaleMale</td> <td>"18, 17."^^<http://www.w3.org/2001/XMLSchema#decimal></td> </tr> </table>		tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveMonthAfterReturnToWorkByFemaleMale	"18, 17."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfEmployeeReturnedToWorkAfterParentalLeaveEndedWhoStillEmployedTwelveMonthAfterReturnToWorkByFemaleMale	"18, 17."^^<http://www.w3.org/2001/XMLSchema#decimal>		

Table B.150 ‘Return To Work Rate Of Employee Who Took Parental Leave’ class

SPARQL query’s answer to CQ150	
Return to work rate by female and male: 100%, 100%.	
subject	object
tclReturnToWorkRateByFemaleMale "100%,100%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.151 ‘Retention Rate Of Employee Who Took Parental Leave’ class

SPARQL query’s answer to CQ 151	
Retention rate of employee who took parental leave by female and male: 83%, 89%.	
subject	object
tclRetentionRateOfEmployeeWhoTookParentalLeaveByFemaleMale "83%,89%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.152 ‘Significant Operation Change’ class

SPARQL query’s answer to CQ152	
Minimum number of weeks’ notice typically provided to employee:	
<p>Transurban has one Enterprise Agreement (EBA) in place, which was negotiated with Employee Representatives and the Australian Services Union. As required by the EBA and relevant awards, Transurban would consult with employees as soon as possible after making a decision involving operational changes. If there are roster changes, this communication would be a minimum of one week beforehand. In all instances Transurban aims to provide as much notice as possible to employees affected by operational changes. The Transurban EBA specifies requirements for notice periods, and consultation provisions.</p>	
subject	object
tclMinimumNumberOfWeekNoticeTypicallyProvidedToEmployee "Transurban has one Enterprise Agreement (EBA) in place, which was negotiated with employee	

Table B.153 ‘Collective Bargaining Agreement’ class

SPARQL query’s answer to CQ153	
Yes.	
subject	object
tclIsNoticePeriodAndProvisionForConsultationAndNegotiationSpecifiedInCollectiveAgreement "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	

Table B.154 'Workforce Represented In Formal Joint Management Worker Health and Safety Committee' class

SPARQL query's answer to CQ154	
<p>The issue of safety is tightly regulated in the vast majority of jurisdictions in which we operate. For example, the largest energy development in which we are currently involved, the Australia Pacific LNG project, is governed by Queensland's Petroleum & Gas (Production & Safety) Act 2004 and Work Health and Safety Act 2011. There are relevant state and federal laws for all our sites and we take great care to comply with all relevant legislation and regulations.</p> <p>We also go beyond this legislation by encouraging voluntary safety standards through our Directives and Toolkits. We created Origin's voluntary safety standards based on our extensive experience and in line with industry best practice. Origin's HSE policy explains our commitment to how we think about, plan and manage health, safety and environment impacts and initiatives across our business. In developing and implementing our HSE Policy, we engage with our employees, contractors, and other stakeholders working with Origin. The Board is responsible for establishing and overseeing the Company's commitment to manage HSE in accordance with Origin's Policy and for monitoring the performance of the Company with respect to its implementation. The Board HSE Committee is chaired by a nominated non-executive Director and operates consistent with its formal charter. The role of the Committee is to support and advise the Board in meeting its responsibilities regarding HSE-associated matters. Origin also has HSE committees across all business areas comprising management, employee and contractor representatives. The role of the HSE Committees is to address employee concerns, workplace hazards and unsafe practices, HSE performance and to formally escalate any HSE issues to management.</p>	
subject	object
orgLevelAtWhichFormalJointManagementWorkerHealthAndSafetyCommitteeTypicallyOperateWithinOrg	"The issue of safety is tightly regulated in the vast majority of jurisdictions in which we operate.

Table B.155 'Type Of Injury For Total Workforce' class

SPARQL query's answer to CQ155	
Types of injuries for employees: Cuts, abrasions, sprains, broken bones and soft tissue injuries.	
subject	object
amcTypeOfInjuryForEmployee	"Cuts, abrasions, sprains, broken bones and soft tissue injuries."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.156 'Injury Rate For Total Workforce' class

SPARQL query's answer to CQ156	
<p>a-Injury rate for total employee: 4.2.</p> <p>b-Region name for employee injury rate: Africa, Asia, Australia, Europe, North America, and South America.</p> <p>c1- Injury rate for employee by Africa region: 3.3.</p> <p>c2- Injury rate for employee by Asia region: 0.4.</p> <p>c3- Injury rate for employee by Australia region: 6.3.</p> <p>c4- Injury rate for employee by Europe region: 4.9.</p> <p>c5- Injury rate for employee by North America region: 3.9.</p> <p>c5- Injury rate for employee by South America region: 2.2.</p>	

subject	object
bhpInjuryRateForTotalEmployee	"4.2."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpRegionNameForEmployeeInjuryRate	"Africa, Asia, Australia, Europe, North America, and South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpInjuryRateForEmployeeByAfricaRegion	"3.3."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpInjuryRateForEmployeeByAsiaRegion	"0.4."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpInjuryRateForEmployeeByEuropeRegion	"4.9."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpInjuryRateForEmployeeByAustraliaRegion	"6.3."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpInjuryRateForEmployeeByNorthAmericaRegion	"3.9."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpInjuryRateForEmployeeBySouthAmericaRegion	"2.2."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.157 'Occupational Disease Rate For Total Workforce' class

SPARQL query's answer to CQ157

a-Occupational disease rate for total employee: 2.84.

b-Region name for employee occupational disease rate: Africa, Asia, Australia, Europe, North America, and South America.

c1- Occupational disease rate for employee by Africa region: 1.23.

c2- Occupational disease rate for employee by Asia region: 0.00.

c3- Occupational disease rate for employee by Australia region: 4.44.

c4- Occupational disease rate for employee by Europe region: 0.00.

c5- Occupational disease rate for employee by North America region: 0.35.

c6- Occupational disease rate for employee by South America region: 1.05.

subject	object
bhpOccupationalDiseaseRateForTotalEmployee	"2.84."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpRegionNameForEmployeeOccupationalDiseaseRate	"Africa, Asia, Australia, Europe, North America, and South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpOccupationalDiseaseRateForEmployeeByAfricaRegion	"1.23."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForEmployeeByAsiaRegion	"0.00."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForEmployeeByAustraliaRegion	"4.44."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForEmployeeByEuropeRegion	"0.00."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForEmployeeByNorthAmericaRegion	"0.35."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForEmployeeBySouthAmericaRegion	"1.05."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.158 'Lost Day Rate For Total Workforce' class

SPARQL query's answer to CQ158	
Lost day rate for employee: 16.7.	
subject	object
orgLostDayRateForEmployee	"16.7."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.159 'Absentee Rate For Total Workforce' class

SPARQL query's answer to CQ159	
a-Absentee rate for total employee: 55.67.	
b-Region name for employee absentee rate: Africa, Asia, Australia, Europe, North America, and South America.	
c1- Absentee rate for employee by Africa region: 52.30.	
c2- Absentee rate for employee by Asia region: 22.58.	
c3- Absentee rate for employee by Australia region: 58.41.	
c4- Absentee rate for employee by Europe region: 10.12.	
c5- Absentee rate for employee by North America region: 31.58.	
c6- Absentee rate for employee by South America region: 68.24.	
subject	object
bhpAbsenteeRateForTotalEmployee	"55.67."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpRegionNameForEmployeeAbsenteeRate	"Africa, Asia, Australia, Europe, North America, and South America."^^<http://www.w3.org/2001/XMLSchema#string>
subject	object
bhpAbsenteeRateForEmployeeByAfricaRegion	"52.30."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsenteeRateForEmployeeByAsiaRegion	"22.58."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsenteeRateForEmployeeByAustraliaRegion	"58.41."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsenteeRateForEmployeeByEuropeRegion	"10.12."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsenteeRateForEmployeeByNorthAmericaRegion	"31.58."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsenteeRateForEmployeeBySouthAmericaRegion	"68.24."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.160 'Work Related Fatality For Total Workforce' class

SPARQL query's answer to CQ160	
a-Absolute number of fatality for total employee: 0.	
b-Region name for employee absolute number of fatality: Africa, Asia, Australia, Europe, North America, and South America.	

c1- Absolute number of fatality for employee by Africa region: 0.	
c2- Absolute number of fatality for employee by Asia region: 0.	
c3- Absolute number of fatality for employee by Australia region: 0.	
c4- Absolute number of fatality for employee by Europe region: 0.	
c5- Absolute number of fatality for employee by North America region: 0.	
c6- Absolute number of fatality for employee by South America region: 0.	

subject	object
bhpAbsoluteNumberOfFatalityForTotalEmployee	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpRegionNameForEmployeeAbsoluteNumberOfFatality	"Africa, Asia, Australia, Europe, North America, and South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpAbsoluteNumberOfFatalityForEmployeeByAfricaRegion	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsoluteNumberOfFatalityForEmployeeByAsiaRegion	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsoluteNumberOfFatalityForEmployeeByAustraliaRegion	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsoluteNumberOfFatalityForEmployeeByEuropeRegion	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsoluteNumberOfFatalityForEmployeeByNorthAmericaRegion	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAbsoluteNumberOfFatalityForEmployeeBySouthAmericaRegion	"0."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.161 ‘Occupational Disease Rate For Independent Contractor’ class

SPARQL query’s answer to CQ161	
a-Occupational disease rate for total contractor: 1.07.	
b-Region name for contractor occupational disease rate: Africa, Asia, Australia, Europe, North America, and South America.	
c1- Occupational disease rate for contractor by Africa region: 0.60.	
c2- Occupational disease rate for contractor by Asia region: 0.00.	
c3- Occupational disease rate for contractor by Australia region: 2.41.	
c4- Occupational disease rate for contractor by Europe region: 0.00.	
c5- Occupational disease rate for contractor by North America region: 0.99.	
c6- Occupational disease rate for contractor by South America region: 0.12.	

subject	object
bhpOccupationalDiseaseRateForTotalContractor	"1.07."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
bhpRegionNameForContractorOccupationalDiseaseRate	"Africa, Asia, Australia, Europe, North America, and South America."^^<http://www.w3.org/2001/XMLSchema#string>

subject	object
bhpOccupationalDiseaseRateForContractorByAfricaRegion	"0.60."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForContractorByAsiaRegion	"0.00."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForContractorByAustraliaRegion	"2.41."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForContractorByEuropeRegion	"0.00."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForContractorByNorthAmericaRegion	"0.99."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpOccupationalDiseaseRateForContractorBySouthAmericaRegion	"0.12."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.162 ‘Formal Agreement With Trade Union’ class

SPARQL query’s answer to CQ162	
a-Whether organization has local or global agreement: Yes.	
b-Type of agreement: Origin has a number of formal agreements in place with trade unions with regards to health and safety of members. These agreements include Medical Examination, Drug and Alcohol Testing and Health, Safety and Environment agreements.	
subject	object
orgWhetherOrgHasLocalOrGlobalAgreementWithTradeUnion "true"^^<http://www.w3.org/2001/XMLSchema#boolean>	
subject	object
orgTypeOfFormalAgreement "Origin has a number of formal agreements in place with trade unions with regards to health and safety of members."	

Table B.163 ‘Employee Training By Gender’ class

SPARQL query’s answer to CQ163	
a-Total number of training hour provided to employee: 9052.	
b-Total number of training hour provided to female, male employee: 3548, 5504.	
c-Average training hour per employee: 14.86.	
d-Average training hour per female, male employee: 12.40, 17.04.	
subject	object
tclTotalNumberOfTrainingHourProvidedToEmployee "9052."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tclTotalNumberOfTrainingHourProvidedToFemaleMaleEmployee "3548, 5504."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tclAverageTrainingHourPerEmployee "14.86."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tclAverageTrainingHourPerFemaleMale "12.40, 17.04."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.164 ‘Employee Training By Category’ class

SPARQL query’s answer to CQ 164	
a-Category name for employee training: CEO, Senior executive, Senior management, Middle management, Manager, Professional / technical, Supervisor / team leader, Customer service, Administration / support.	
b1- Total number of training hours provided to employee by CEO category: 44.	
b2- Total number of training hours provided to employee by Senior Executive: 403.	
b3- Total number of training hours provided to employee by Senior Management category: 818.	
b4- Total number of training hours provided to employee by Middle Management category: 1582.	
b5- Total number of training hours provided to employee by Manager category: 1472.	
b6- Total number of training hours provided to employee by Professional category: 2904.	

- b7- Total number of training hours provided to employee by Supervisor category: 365.
- b8- Total number of training hours provided to employee by Customer Service category: 1040.
- b9- Total number of training hours provided to employee by Administration category: 424.
- c1- Average training hours of employee by CEO category: 44.
- c2- Average training hours of employee by Senior Executive category: 45.
- c3- Average training hours of employee by Senior Management category: 37.
- c4- Average training hours of employee by Middle Management category: 31.
- c5- Average training hours of employee by Manager category: 29.
- c6- Average training hours of employee by Professional category: 11
- c7- Average training hours of employee by Supervisor category: 15.
- c8- Average training hours of employee by Customer Service category: 8.
- c9- Average training hours of employee by Administration category: 7.

subject	object
tdCategoryNameForEmployeeTraining	"CEO, Senior executive, Senior management, Middle management, Manager, Professional / technical, Supervisor / team leader, Customer service, Administration"

subject	object
tdTotalNumberOfTrainingHourProvidedToEmployeeBySeniorManagementCategory	"818."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeBySeniorExecutiveCategory	"403."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeByCEOCategory	"44."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeByMiddleManagementCategory	"1582."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeByManagerCategory	"1472."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeByProfessionalCategory	"2904."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeBySupervisorCategory	"365."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeByCustomerServiceCategory	"1040."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdTotalNumberOfTrainingHourProvidedToEmployeeByAdministrationCategory	"424."^^<http://www.w3.org/2001/XMLSchema#decimal>

subject	object
tdAverageTrainingHourOfEmployeeBySeniorExecutiveCategory	"45."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeByMiddleManagementCategory	"31."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeBySeniorManagementCategory	"37."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeByManagerCategory	"29."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeByCEOCategory	"44."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeBySupervisorCategory	"15."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeByProfessionalCategory	"11."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeByCustomerServiceCategory	"8."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdAverageTrainingHourOfEmployeeByAdministrationCategory	"7."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.165 ‘Employee Training Program’ class

subject	object
bhpTypeAndScopeOfProgramImplementedAndAssistanceProvidedToUpgradeEmployeeSkill	"In FY2014, our leaders participated in a series of Executive Leadership Programs (ELPs) to provide them with the support they need to evolve our culture and enable our people to step up. Participants from across the Group engaged in discussions about further strengthening our step-up culture and leading change. Ideas and feedback from the sessions were integrated back into the Businesses, with senior leadership teams connecting after each event to share learnings. The ELP was 100 per cent leader-led, highly experiential and dialogue-based’.

Table B.166 'Transition Assistance Program' class

SPARQL query's answer to CQ166	
As a global organization, we experience continual change. To assist our people and their immediate families to deal with any issues that may be affecting their life or work, a 24-hour Employee Assistance Program is available to offer free confidential support and counselling.	
subject	object
bhpTransitionAssistanceProgramProvidedToSupportEmployee "As a global organisation, we experience continual change. To assist our people and their immediate families	

Table B.167 'Employee Who Received Regular Performance and Career Development Review By Gender' class

SPARQL query's answer to CQ 167	
Percentage of employee who received regular performance and career development Review by female, male: 99.7%, 90.8%.	
subject	object
orgPercentageOfEmployeeWhoReceivedRegularPerformanceAndCareerDevelopmentReviewByFemaleMale "99.7%, 90.8%."^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.168 'Individual Within Governance Body' class

SPARQL query's answer to CQ168	
Total number of individual within governance body per female and male: 8: 2, 6.	
subject	object
tdTotalNumberOfIndividualWithinGovernanceBodyPerFemaleMale "8: 2,6."^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.169 'Individual Within Governance Body By Gender' class

SPARQL query's answer to CQ169	
Percentage of individual within governance body by female, male: 25%, 75%.	
subject	object
tdlPercentageOfIndividualWithinGovernanceBodyByFemaleMale "25%, 75%."^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.170 'Individual Within Governance Body By Age Group' class

SPARQL query's answer to CQ170	
a1- Total number of individual within governance body by age group 30 To 50 year old and female, male: 2:1, 1.	
a2- Percentage of individual within governance body by age group 30 To 50 year old and female, male: 12.5%, 12.5%.	
b1-Total number of individual within governance body by age group over 50 year old and female, male: 6: 1, 5.	
b2- Percentage of individual within governance body by age group over 50 year old and female, male: 12.5%, 62.5%.	

subject	object
tdTotalNumberOfIndividualWithinGovernanceBodyByAgeGroup30To50YearOldPerFemaleMale "2: 1,1"^^<http://www.w3.org/2001/XMLSchema#decimal>	
tdPercentageOfIndividualWithinGovernanceBodyByAgeGroup30To50YearOldPerFemaleMale "12.5%, 12.5%"^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdPercentageOfIndividualWithinGovernanceBodyByAgeGroupOver50YearOldPerFemaleMale "12.5%, 62.5%"^^<http://www.w3.org/2001/XMLSchema#decimal>	
tdTotalNumberOfIndividualWithinGovernanceBodyByAgeGroupOver50YearOldPerFemaleMale "6: 1, 5"^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.171 'Employee Category' class

SPARQL query's answer to CQ171				
Employee category name: CEO, senior executive, senior management, middle management, manager, professional / technical, supervisor /team leader, customer service, administration / support.				
<table border="1"> <thead> <tr> <th>subject</th> <th>object</th> </tr> </thead> <tbody> <tr> <td>tdEmployeeCategoryNameLA12 "CEO, senior executive, senior management, middle management,manager, professional / technical, supervisor /team leader, customer service,</td> <td></td> </tr> </tbody> </table>	subject	object	tdEmployeeCategoryNameLA12 "CEO, senior executive, senior management, middle management,manager, professional / technical, supervisor /team leader, customer service,	
subject	object			
tdEmployeeCategoryNameLA12 "CEO, senior executive, senior management, middle management,manager, professional / technical, supervisor /team leader, customer service,				

Table B.172 'Employee Category By Gender' class

SPARQL query's answer to CQ172
Total number of employee per employee category CEO, female and male: 1: 0, 1.
Total number of employee per employee category Senior Executive, female and male: 9: 4, 5.
Total number of employee per employee category Senior Management, female and male: 22: 6, 16.
Total number of employee per employee category Middle Management, female and male: 51: 11, 40.
Total number of employee per employee category Manager, female and male: 50: 19, 31.
Total number of employee per employee category Professional, female and male: 264: 83, 181.
Total number of employee per employee category, Supervisor female and male: 24: 11, 13.
Total number of employee per employee category Customer Service, female and male: 130: 104, 26.
Total number of employee per employee category Administration, female and male: 58: 48, 10.
Percentage of employee per employee category CEO, female and male: 0.2%: 0.0%, 0.2%.
Percentage of employee per employee category Senior Executive, female and male: 1.5%: 0.7%, 0.8%.
Percentage of employee per employee category Senior Management, female and male: 3.6%: 1.0%, 2.6%.
Percentage of employee per employee category Middle Management, female and male: 8.4%: 1.8%, 6.6%.
Percentage of employee per employee category Manager, female and male: 8.2%: 3.1%, 5.1%.
Percentage of employee per employee category Professional, female and male: 43.3%: 13.6%, 29.7%.
Percentage of employee per employee category Supervisor, female and male: 3.9%: 1.8%, 2.1%.
Percentage of employee per employee category Customer Service female and male: 21.3%: 17.1%, 4.3%.
Percentage of employee per employee category Administration female and male: 9.5%: 7.9%, 1.6%.

subject	object
tclTotalNumberOfEmployeeByAdministrationCategoryAndFemaleMale	"58: 48, 10."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeByAdministrationCategoryAndFemaleMale	"9.5%: 7.9%, 1.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeByManagerCategoryAndFemaleMale	"50: 19, 31."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeBySupervisorCategoryAndFemaleMale	"24: 11, 13."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeBySeniorExecutiveCategoryAndFemaleMale	"9: 4, 5."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeByEmployeeCategoryPerFemaleMale	"609: 286, 323."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeBySeniorExecutiveCategoryAndFemaleMale	"1.5%: 0.7%, 0.8%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeBySupervisorCategoryAndFemaleMale	"3.9%: 1.8%, 2.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeByManagerCategoryAndFemaleMale	"8.2%: 3.1%, 5.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeByProfessionalCategoryAndFemaleMale	"43.3%: 13.6%, 29.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeByCustomerServiceCategoryAndFemaleMale	"130: 104, 26."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeByMiddleManagementCategoryAndFemaleMale	"264: 83, 181."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeByCustomerServiceCategoryAndFemaleMale	"21.3%: 17.1%, 4.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeByCEOCategoryAndFemaleMale	"0.2%: 0.0%, 0.2%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeBySeniorManagementCategoryAndFemaleMale	"3.6%: 1.0%, 2.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeByMiddleManagementCategoryAndFemaleMale	"51: 11, 40."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeBySeniorManagementCategoryAndFemaleMale	"22: 6, 16."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeeByEmployeeCategoryPerFemaleMale	"47%, 53%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclTotalNumberOfEmployeeByCEOCategoryAndFemaleMale	"1: 0, 1."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.173 'Employee Category By Age Group Under 30 Year Old' class

SPARQL query's answer to CQ 173	
Percentage of employee per employee category CEO by age group under 30 years old: 0.0%.	
Percentage of employee per employee category Senior Executive by age group under 30 years old: 0.00%.	
Percentage of employee per employee category Senior Management by age group under 30 years old: 0.0%.	
Percentage of employee per employee category Middle Management by age group under 30 years old: 0.0%.	
Percentage of employee per employee category Manager by age group under 30 years old: 0.2%.	
Percentage of employee per employee category Professional by age group under 30 years old: 5.7%.	
Percentage of employee per employee category Supervisor by age group under 30 years old: 0.7%.	
Percentage of employee per employee category Customer Service by age group under 30 years old: 3.3%.	
Percentage of employee per employee category Administration by age group under 30 years old: 2.5%.	
subject	object
tclPercentageOfEmployeePerEmployeeCategoryManagerByAgeGroupUnder30YearOld	"0.2%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategorySeniorExecutiveByAgeGroupUnder30YearOld	"0.00%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategoryProfessionalByAgeGroupUnder30YearOld	"5.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategorySeniorManagementByAgeGroupUnder30YearOld	"0.0%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategoryCustomerServiceByAgeGroupUnder30YearOld	"3.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategoryMiddleManagementByAgeGroupUnder30YearOld	"0.0%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategorySupervisorByAgeGroupUnder30YearOld	"0.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategoryCEOByAgeGroupUnder30YearOld	"0.0%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tclPercentageOfEmployeePerEmployeeCategoryAdministrationByAgeGroupUnder30YearOld	"2.5%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.174 'Employee Category By Age Group 30To50 Year Old' class

SPARQL query's answer to CQ 174	
Percentage of employee per employee category CEO by age group 30 to 50 years old: 0.2%.	
Percentage of employee per employee category Senior Executive by age group 30 to 50 years old: 1.1%.	

Percentage of employee per employee category Senior Management by age group 30 to 50 years old: 2.6%.

Percentage of employee per employee category Middle Management by age group 30 to 50 years old: 7.1%.

Percentage of employee per employee category Manager by age group 30 to 50 years old: 6.7%.

Percentage of employee per employee category Professional by age group 30 to 50 years old: 32.3%.

Percentage of employee per employee category Supervisor by age group 30 to 50 years old: 0.7%.

Percentage of employee per employee category Customer Service by age group 30 to 50 years old: 12.5%.

Percentage of employee per employee category Administration by age group 30 to 50 years old: 5.9%.

subject	object
tdPercentageOfEmployeePerEmployeeCategorySeniorExecutiveByAgeGroup30To50YearOld	"1.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryCEOByAgeGroup30To50YearOld	"0.2%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryAdministrationByAgeGroup30To50YearOld	"5.9%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryMiddleManagementByAgeGroup30To50YearOld	"7.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryCustomerServiceByAgeGroup30To50YearOld	"12.5%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategorySeniorManagementByAgeGroup30To50YearOld	"2.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryProfessionalByAgeGroup30To50YearOld	"32.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategorySupervisorByAgeGroup30To50YearOld	"2.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryManagerByAgeGroup30To50YearOld	"6.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.175 'Employee Category By Age Group Over50 Year Old' class

SPARQL query's answer to CQ 175

Percentage of employee per employee category CEO by age group over 50 years old: 0.0%.

Percentage of employee per employee category Senior Executive by age group over 50 years old: 0.3%.

Percentage of employee per employee category Senior Management by age group over 50 years old: 1.0%.

Percentage of employee per employee category Middle Management by age group over 50 years old: 1.3%.

Percentage of employee per employee category Manager by age group over 50 years old: 1.3%.

Percentage of employee per employee category Professional by age group over 50 years old: 5.3%.

Percentage of employee per employee category Supervisor by age group over 50 years old: 0.7%.

Percentage of employee per employee category Customer Service by age group over 50 years old: 5.6%.

Percentage of employee per employee category Administration by age group over 50 years old: 1.1%.

subject	object
tdPercentageOfEmployeePerEmployeeCategoryMiddleManagementByAgeGroupOver50YearOld	"1.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryProfessionalByAgeGroupOver50YearOld	"5.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryCEOByAgeGroupOver50YearOld	"0.0%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryAdministrationByAgeGroupOver50YearOld	"1.1%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategorySupervisorByAgeGroupOver50YearOld	"0.7%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategorySeniorManagementByAgeGroupOver50YearOld	"1.0%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryCustomerServiceByAgeGroupOver50YearOld	"5.6%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategoryManagerByAgeGroupOver50YearOld	"1.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>
tdPercentageOfEmployeePerEmployeeCategorySeniorExecutiveByAgeGroupOver50YearOld	"0.3%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.176 'Ratio Of Basic Salary and Remuneration Of Woman To Man By Employee Category By Significant Location Of Operation Indicator' class/ LA13

SPARQL query's answer to CQ 176	
Employee category name LA13: Senior leaders, managers, supervisory and professionals, operators and general support.	
subject	object
bhpEmployeeCategoryNameLA13	"Senior leaders, managers, supervisory and professionals, operators and general support."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.177 'Ratio Of Basic Salary Male To Female Per Employee Category' class

SPARQL query's answer to CQ 177	
a1- Ratio of basic salary male to female for employee category manager: 1.05.	
a2- Ratio of basic salary male to female for employee category operators and general support: 1.08.	
a3- Ratio of basic salary male to female for employee category senior leaders: 1.07.	
a4- Ratio of basic salary male to female for employee category supervisory and professionals: 1.14.	
a5- Average ratio of basic salary male to female for employee category: 1.03.	
b- Measurement unit for ratio of basic salary male to female for employee category: \$ US.	
subject	object
bhpRatioOfBasicSalaryMaleToFemaleForEmployeeCategorySeniorLeader	"1.07."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpAverageRatioOfBasicSalaryMaleToFemaleForEmployeeCategory	"1.03."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpRatioOfBasicSalaryMaleToFemaleForEmployeeCategoryManager	"1.05."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpRatioOfBasicSalaryMaleToFemaleForEmployeeCategoryOperatorAndGeneralSupport	"1.08."^^<http://www.w3.org/2001/XMLSchema#decimal>
bhpRatioOfBasicSalaryMaleToFemaleForEmployeeCategorySupervisoryAndProfessional	"1.14."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpMeasurementUnitForRatioOfBasicSalaryMaleToFemaleForEmployeeCategory	"\$ US."^^<http://www.w3.org/2001/XMLSchema#string>

Table B.178 'Grievance Labor Practice Filed' class

SPARQL query's answer to CQ 178	
Total number of grievance labor practice filed: 2.	
subject	object
tcdTotalNumberOfGrievanceLaborPracticeFiled	"2."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.179 'Grievance Labor Practice Addressed' class

SPARQL query's answer to CQ 179	
Total number of grievance labor practice addressed: 2.	
subject	object
tcdTotalNumberOfGrievanceLaborPracticeAddressed	"2."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.180 ‘Grievance Labor Practice Resolved’ class

SPARQL query’s answer to CQ 180	
Total number of grievance labor practice resolved: 2.	
subject	object
tdTotalNumberOfGrievanceLaborPracticeResolved "2."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.181 ‘Training On Human Right Policy Or Procedure Concerning Aspect Of Human Right That Is Relevant To Operation’ class/ HR2

SPARQL query’s answer to CQ 181	
a-Total number of hours devoted to training on human rights policies and procedures relevant to operation: 3061.	
b-Total number of employee who received training on human right policies or procedures relevant to operation: 644.	
c-Percentage of employee training in human rights policy or procedure concerning aspect of Human right that is relevant to operation: 107%.	
subject	object
tdTotalNumberOfHourDevotedToTrainingOnHumanRightPolicyOrProcedureRelevantToOperation "3061."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdTotalNumberOfEmployeeWhoReceivedTrainingOnHumanRightPolicyOrProcedureRelevantToOperation "644."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
tdPercentageOfEmployeeTrainingInHumanRightPolicyOrProcedureConcerningAspectOfHumanRightThatIsRelevantToOperation "107%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.182 ‘Incident Of Discrimination On Ground Of Other Relevant Form Of Discrimination’ class

SPARQL query’s answer to CQ 182	
Total number of Incident of discrimination: 1,996.	
subject	object
bhpTotalNumberOfIncidentOfDiscrimination "1,996."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.183 ‘Status Of Incident Of Discrimination’ class

SPARQL query’s answer to CQ 183	
a-Incident reviewed by organization: Of these, 1,572 cases were raised via our human resources or business representatives and 424 were raised through ethics point.	
b-Remediation plans have been implemented and results reviewed: In line with our reporting requirements, 203 cases concerning harassment and equality in employment were recorded and appropriately investigated. Of these cases, 24 remain open as at 30 June 2014.	

subject	object
bhpIncidentReviewedByOrg	"Of these, 1,572 cases were raised via our human resources or business representatives and 424 were raised
subject	object
bhpRemediationPlanHasBeenImplementedAndResultReviewed	"In line with our reporting requirements, 203 cases concerning harassment

Table B.184 'Action Taken Against Incident Of Discrimination' class

SPARQL query's answer to CQ 184	
Action taken against incident of discrimination: In 93 cases, appropriate disciplinary actions, including termination, were instituted. Of the outstanding cases from FY2013, two remain under investigation.	
subject	object
bhpIncidentNoLongerSubjectToAction	"In 93 cases, appropriate disciplinary actions, including termination, were instituted.

Table B.185 'Security Personnel' class

SPARQL query's answer to CQ185	
a-Total number of security personnel: 2038.	
b-Total number of security personnel received formal training on human right policy or procedure: 1563.	
c-Percentage of security personnel received formal training on human right policy or procedure: 77%.	
subject	object
bhpTotalNumberOfSecurityPersonnel	"2038."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpTotalNumberOfSecurityPersonnelReceivedFormalTrainingOnHumanRightPolicyOrProcedure	"1563."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
bhpPercentageOfSecurityPersonnelReceivedFormalTrainingOnHumanRightPolicyOrProcedure	"77%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.186 'Incident Involving Right Of Indigenous People' class

SPARQL query's answer to CQ186	
Total number of incident of violation involving right of indigenous people: 5.	
subject	object
bhpTotalNumberOfIncidentOfViolationInvolvingRightOfIndigenousPeople	"5."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.187 'Status Of Incident Of Violation' class

SPARQL query's answer CQ187	
Incident of violation involving right of indigenous people reviewed by organization: Roche and Tamaquito relocations were completed during the year and Las Casitas construction was finalized.	
subject	object
bhpIncidentOfViolationInvolvingRightOfIndigenousPeopleReviewdByOrg	"Roche and Tamaquito relocations were completed during the year and Las Casitas construction v

Table B.188 'Organization Wide' class

SPARQL query's answer to CQ 188	
a-Name of operations that has undertaken organization wide: LNG Bussiness Unit: Australia Pacific LNG Exploration & Production Business Unit: Beharra Springs, Jingemia, Kupe Production, RKM production station, Otway gas project, BassGass, Ironbark project, Surat assets, Halladale Blackwatch Project, Generation Business Unit: Mt Stuart Power Station, Roma Power Station, Darling Downs Power Station, Cullerin Range Wind Farm, Eraring Power station (inc shoalhaven scheme), Uranquinty Power Station, Quarantine Power Station, Ladbroke Grove Power Station, Mortlake Power Station, Mortlake Pipeline, Stockyard Hill Wind Farm project.	
b-Total number of operations that has undertaken organization wide: 21.	
subject	object
orgNameOfOperationThatHasUndertakenOrganizationWide	"LNG Bussiness Unit: Australia Pacific LNG Exploration & Production Business Unit: Bel
subject	object
orgTotalNumberOfOperationThatHasUndertakenOrganizationWide	"21."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.189 'Operation With Implemented Local Community Engagement' class

SPARQL query's answer to CQ 189	
a-Total number of operations that have undertaken organization wide with implemented local community engagement: 10. b-Percentage of operations with implemented local community engagement: 48%.	
subject	object
orgTotalNumberOfOperationThatHasUndertakenOrganizationWideLocalCommunityEngagement	"10."^^<http://www.w3.org/2001/XMLSchema#decimal>
subject	object
orgPercentageOfOperationWithImplementedLocalCommunityEngagement	"48%."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.190 ‘Operation With Implemented Impact Assessment’ class

SPARQL query’s answer to CQ 190	
a-Total number of operations that have undertaken organization wide with implemented impact assessment: 5.	
b-Percentage of operations with implemented impact assessment: 24%.	
subject	object
orgTotalNumberOfOperationThatHasUndertakenOrganizationWideImpactAssessment "5."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
orgPercentageOfOperationWithImplementedImpactAssessment "24%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.191 ‘Operation With Implemented Development Program’ class

SPARQL query’s answer to CQ 191	
a-Total number of operations that have undertaken organization wide development program: 6.	
b-Percentage of operations with implemented development program: 28%.	
subject	object
orgTotalNumberOfOperationThatHasUndertakenOrganizationWideDevelopmentProgram "6."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
orgPercentageOfOperationWithImplementedDevelopmentProgram "28%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.192 ‘Operation With Significant Actual Or Potential Negative Impact On Local Community Indicator’ class/ SO2

SPARQL query’s answer to CQ 192	
a-Location of operation on local community: Australia Pacific LNG, Otway Gas Project, BassGass, the Ironbark CSG project, Surat assets, Eraring Power Station, Uranquinty Power Station, Mortlake Power Station, Mortlake Pipeline, and Stockyard Hill Windfarm.	
b-Significant actual and potential negative impact of operation on local community: The scale of our operations affects neighboring communities – sometimes positively and sometimes in ways that create challenges requiring careful management. People living near our operations can be affected by increases in traffic, noise and dust. They may also be affected by socio-economic factors resulting from our presence, such as increased housing costs and competition for labor. Origin must manage these issues sensitively and acknowledge the loss of control and power people in the community may feel as a result of our large-scale infrastructure projects.	
c-Source of information about actual and potential negative impact of operation on local Community: Actual performance data. http://www.originenergy.com.au/content/dam/origin/about/our-approach/docs/sustainability-impact-on-communities.pdf	

subject	object
orgLocationOfOperationOnLocalCommunity	"Australia Pacific LNG, Otway Gas Project, BassGas, the Ironbark CSG project, Surat assets, Eraring Power Station, Uranquinty"
subject	object
orgSignificantActualAndPotentialNegativeImpactOfOperationOnLocalCommunity	"The scale of our operations affects neighbouring communities – sometimes positively and sometimes"
subject	object
orgSourceOfInformationAboutActualAndPotentialNegativeImpactOfOperationOnLocalCommunity	"Actual performance data. http://www.originenergy.com.au/content/dam/origin/ "

Table B.193 'Total Value Of Political Contribution By Country and Recipient' class/ S06

SPARQL query's answer to CQ 193	
a-Total monetary value of financial and in kind political contribution: 105,705.	
b-Country and recipient name and cause: Payments for attendance at political functions in Australia (which are normally described as political contributions).	
c-Measurement unit of financial and in kind political contribution: \$ AU.	
subject	object
orgTotalMonetaryValueOfFinancialAndInKindPoliticalContribution	"105,705."^^< http://www.w3.org/2001/XMLSchema#decimal >
subject	object
orgCountryAndRecipientName	"Payments for attendance at political functions in Australia (which are normally described as political contributions)."
subject	object
orgMeasurementUnitOfFinancialAndInKindPoliticalContribution	"\$ AU."^^< http://www.w3.org/2001/XMLSchema#string >

Table B.194 'International Declaration Convention Treaty and National Sub National Regional and Local Regulation' class

SPARQL query's answer to CQ 194	
a-Total number of non-monetary sanction for failure to comply with society law and regulation: 346.	
b-Total monetary value of significant fine for failure to comply with society law and regulation: 552,962.	
c-Measurement unit of significant fine for failure to comply with society law and regulation: \$ US.	
subject	object
bhpTotalNumberOfNonMonetarySanctionForFailureToComplyWithSocietyLawAndRegulation	"346."^^< http://www.w3.org/2001/XMLSchema#decimal >
subject	object
bhpTotalMonetaryValueOfSignificantFineForFailureToComplyWithSocietyLawAndRegulation	"552,962."^^< http://www.w3.org/2001/XMLSchema#decimal >
subject	object
bhpMeasurementUnitOfSignificantFineForFailureToComplyWithSocietyLawAndRegulation	"\$ US."^^< http://www.w3.org/2001/XMLSchema#string >

Table B.195 ‘Grievance About Impact On Society Filed’ class

SPARQL query’s answer to CQ 195	
a-Total number of grievance filed about impact on society: 262.	
b-Nature, location, and party of grievance about impact on society filed: Origin filed of community complaints related to our Exploration & Production, LNG and Energy Markets operations. People may be affected by socio-economic factors resulting from our presence, such as increased housing costs and competition for labor.	
subject	object
orgTotalNumberOfGrievanceFiledAboutImpactOnSociety "262."^^<http://www.w3.org/2001/XMLSchema#decimal>	
subject	object
orgNatureLocationAndPartyOfGrievanceFiledAboutImpactOnSociety "Origin filed of community complaints related to our Exploration	

Table B.196 ‘Grievance About Impact On Society Addressed’ class

SPARQL query’s answer to CQ 196	
Total number of grievance addressed about impact on society: 131.	
subject	object
orgTotalNumberOfGrievanceAddressedAboutImpactOnSociety "131."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.197 ‘Grievance About Impact On Society Resolved’ class

SPARQL query’s answer to CQ 197	
Total number of grievance resolved about impact on society: 123.	
subject	object
orgTotalNumberOfGrievanceResolvedAboutImpactOnSociety "123."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.198 ‘Incident Of Non-Compliance With Regulation Concerning Health and Safety Impact Of Product and Service Resulting In Fine Or Penalty’ class

SPARQL query’s answer to CQ 198	
Total number of incident of non-compliance with regulation concerning health and safety impact of product and service resulting in fine or penalty: 3.	
subject	object
amcTotalNumberOfIncidentOfNonComplianceWithRegulationConcerningHealthAndSafetyImpactOfProductAndServiceResultingInFineOrPenalty "3."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.199 'Result Or Key Of Survey For Whole Org' class

SPARQL query's answer to CQ 199	
Result of customer satisfaction survey: 70%.	
subject	object
orgResultOfCustomerSatisfactionSurvey "70%."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.200 'Customer Satisfaction' class

SPARQL query's answer to CQ 200	
<p>How was customer satisfaction measured: Customer Satisfaction is a direct measure of satisfaction levels of customers who make phone contact with us. We gather the results by contacting a selection of customers who have had a recent experience with our call center (approximately 500 successful responses per week) and ask them to rate both their overall satisfaction with Origin, as well as their call center experience on a scale of zero to 10. We aim for a score of eight and above for 65 per cent or more of those surveyed. Ratings given that are eight to 10 (inclusive) out of 10 are classified as customers being satisfied with their call center experience. Customer satisfaction has increased in FY 2014 to 70 per cent from 65 per cent in FY 2013. We also capture the reason behind each customer's rating, and use this information to enhance customer service delivery.</p>	
subject	object
orgHowCustomerSatisfactionIsMeasured "Customer Satisfaction is a direct measure of satisfaction levels of customers who make phone	

Table B.201 'Incident Of Non-Compliance With Voluntary Code Concerning Marketing Communication' class

SPARQL query's answer to CQ201	
Total number of Incident of non-compliance with voluntary code concerning marketing communication: 6.	
subject	object
orgTotalNumberOfIncidentOfNonComplianceWithVoluntaryCodeConcerningMarketingCommunication "6."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.202 'Complaint Regarding Breach Of Customer Privacy' class/ PR8

SPARQL query's answer to CQ202	
total number of substantiated complaints received concerning breaches of customer privacy: 7.	
subject	object
tdlTotalNumberOfSubstantiatedComplaintReceivedConcerningBreachOfCustomerPrivacy "7."^^<http://www.w3.org/2001/XMLSchema#decimal>	

Table B.203 'Complaint Received From Outside Party' class

SPARQL query's answer to CQ 203	
Complaints received from outside parties and substantiated by the company:	
subject	object
ttlHowManyComplaintReceivedFromOutsidePartyAndSubstantiatedByCompany	"2."^^<http://www.w3.org/2001/XMLSchema#decimal>

Table B.204 'Leak Of Customer Data' class

SPARQL query's answer to CQ 204	
Total number of identified leaks of customer data: 3.	
subject	object
ttlTotalNumberOfIdentifiedLeakOfCustomerData	"3."^^<http://www.w3.org/2001/XMLSchema#decimal>