

Information Mining from New Zealand published annual reports relating Maori affairs

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Abstract

This thesis aims to design and implement an information system which will mine information from online annual reports across organizations in New Zealand which have made efforts towards enhancing Mātauranga Māori in line with the New Zealand government's long term strategic objectives. A system has been proposed that will be able to traverse through a large number of annual reports and extract information on the presence and the extent activities related to Mātauranga across institutions. The extracted information includes examples of initiatives towards education, health, and housing, as well as data on the success rate of such initiatives. A total of 216 annual reports published by 48 different organizations in the period 2008-2015 were used as the data source and they include governmental, non-governmental, private and trust organizations. The proposed system makes use of NLP, the Semantic web, Ontology and RDF technology to extract, encode and present the information. Four sets of relations have been developed for four different sectors which include Health, Education, Finance, and Language and Culture. It resulted in the identification of 330 triples (subject-predicate-object) which encodes pertinent information in the organization concerning Maori and Pacific people. A tool has been developed and implemented for converting normal text into ontologies to analyze them. In order to do this, we used open NLP derived from Apache, Protégé from Stanford University, Owl GRED and the Visual Web Data was used. The ontologies developed were analyzed using XML and graphical analysis which shows how natural text can be converted into relational ontologies with Resource Description Framework presentation.

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List of Abbreviations

Short Form	Meaning
OWL	Web Ontology Language
RDF	Resource Description Framework
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
NLP	Natural Language Processing

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgments), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Md Rashedul Islam

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1 Introduction

The Maori are the native or indigenous Polynesian people of New Zealand (Aotearoa – The Long White Cloud). They arrived in New Zealand from eastern Polynesia in several waves some time before 1300 CE. Over several centuries in isolation, the Maori developed a unique culture with their own language, a rich mythology, distinctive crafts and performing arts. They formed a tribal society based on East Polynesian social customs and organisation. They introduced horticulture flourished using plants, and after about 1450 CE a prominent warrior culture emerged.[12]

There are more than 712,000 Maori people living in New Zealand which makes up approximately 15 percent of the total population. Every year the population of Maori ethnicity is increasing by 1.5 percent [24]. The New Zealand government has a huge number of activities for the development of Maori people. The government have established a full ministry for Maori development called the Ministry of Māori Development[25]. There are a lot of organizations [17] in which the main activities are focused on Maori affair's. Apart from these organizations, others also have a great interest and concern for Maori people's development in various ways. There are a number of mediums where we can collect information about the activities of the organizations for Maori people. The most available are radio, television, news papers, articles, journals, annual reports of organizations and books. Among all media, annual reports are different from others because the content is supplied from an organization's own data and the organization is responsible for the annual report.

An annual report is the official statement of an organization where they describe their operations and financial condition. Usually organizations publish their annual report every year. A typical annual report contains, the financial condition overview, a financial statement, a message for shareholders, management, discussion and analysis, and narrative text which contains activities of organizations. The reports also provide an idea about the future plan of the organizations. In New Zealand some organizations are required to produce and publish their annual report by legislation, while others produce them as information for clients and the public. Hence, a large majority of organizations in New Zealand publish annual reports and most of these are available as public online documents. Currently there are hundreds of annual reports available online in free text form formatted as PDF, HTML, and word documents. The screenshot in Figure 1 shows the first page of a sample search on Google with the keywords 'annual report nz'.

The extraction of usable knowledge from annual reports comes at a prohibitive cost since the information is organized as free text which is meant for human consumption only. Individual reports are usually read mostly by people who are stakeholders in the institution. Although in some cases interested individuals may pursue multiple documents from many institutions that serve a common interest, and typically it is very difficult for a human reader to obtain a global perspective due to the sheer volume of entities of interest and their inter-relationships involved.

From the difficulty of mining the information from annual reports we are motivated to design a system. Our main aim is to design and implement an information system which will mine information from online annual reports across organizations in New Zealand which have made efforts towards enhancing Maori in line with the governments long term strategic objectives. The proposed system will be able to link the information across the organizations and would be invaluable for peer to peer institutional coordination as well as higher level strategic planners and fund managers. The information system proposed

will be able to traverse through hundreds of annual reports and report on the types of activities across organizations and the resources involved, including human expertise.

There could be human expertise already working across institutions which can be tapped into for advice or engagement by other institutions that are looking to enhance similar types of activities. The information system will also be useful for tracking an individual organizations progress in terms of Maturanga Maori enhancement by mining information across annual reports from previous years. This will be extremely useful for planners and fund managers for a more focused fund distribution in an effort to get the best value for money. The tool proposed in this project will be able to exploit valuable information embedded in organizational annual reports for the purpose of Maturanga Maori advancement, however the fundamental architecture will also be applicable for information extraction of any other type. For instance, it will also be useful for extracting information such as efforts towards environment, gender equality as well as to answer questions such as 'is there someone sitting on too many boards?' or 'Is there a conflict of interest between person X who is representing organization Y while sitting on board Z?.

There are a lot of research work has done where data extracting and Maori issue was an important topics. We have collected and gone through several research work those are related on data extracting and Maori issue. Maori issues focused in research in various way for instance, Maori people has used as an object with other object in data mining research [14], Maori issue come as a part of Predicting student success by mining enrollment data[15], Maori issue used as a domain of medical data mining research[16], New Zealand survey research[31] has a great attention about Maori issue. But we could not find any research work where annual report has used as main data source and Maori issue was the main focus point. We believe our proposed system will fill this gap. Our propose system will be a great source of Maori affairs related with New Zealand organizations. Where people can extract information and reuse the data for different purposes. The result will be a great source of Maori encyclopedia.

Data mining is an approach that has been developed to automatically process and extract actionable knowledge which would otherwise be impossible to discover due to the sheer volume of data involved. It has been applied successfully across virtually possible application domain and has gained wide acceptance as a powerful methodology of knowledge extraction whenever large data volumes are involved. It draws on techniques for Big Data management, Artificial Intelligence and Statistical learning and is now recognized as a mature discipline. In the research setting that we are proposing, a sub-discipline of text mining that deals with textual objects as opposed to purely numeric data has also shown to be effective at capturing patterns from large collections of textual documents. Thus, in this research we propose a text mining approach to automatically obtain a global perspective from collections of large and inter-related collections of textual documents.

The proposed information system will be implemented as a web service and can have public as well as monitored access levels. It will initially traverse the web of documents to locate annual reports for all New Zealand organizations from trusted URL's and extract entities of interest by applying various text mining techniques. The extracted information will then be organized and stored in a compact format in a repository. The web will then be monitored on a periodic basis and updates will be made and when necessary to the knowledge repository that was created. Such activities are generic and can be applied to other types of information system development tools.

The pre-processed documents in the repository are then used for information extraction relevant to the concepts of interest to Maturanga Maori. The information content

developed in consultation with domain experts in Mataranga Maori affairs. The inter-document information, connection and extraction has been carried out in real time via a conversational agent. Users will be able to pose questions in natural language to the system which will function as an interactive question answering system. The system retrieves answers from the repository which stored the knowledge in the form of linked data [20] mined from the annual reports as part of the offline pre-processing step. The retrieved information is then formulated as a natural language answer using various techniques described in linked data [20, 26], the semantic web [29], ontology [22], and RDF (Resource Description Framework) [11, 6]. The user can then pose further questions based on the information on the previous answer and/or request for new information. The system answer can contain graphs, aggregations, links and other forms of visualizations which might be appropriate based on the type of information requested.

In our thesis we have narrowed down our focus to specific research questions that can be implemented on our target data. We will focus on the following research questions:

- Mining Maori affair's from published annual reports from New Zealand organizations.
- Mining in order to show relation between organizations and Maori.
- Developing ontologies from relationships between organizations and Maori.
- Extracting ontologies from natural text.
- Presenting ontologies in RDF (Resource Description Framework) format.

New Zealand is well known world wide as a welfare country and is one of the most livable counties in the world because the government provides all basic needs of the citizens. The government has a great plan for the health sector and as a result most of the health service providers are subsidized by the government. Education is free starting from primary to high-school. The department of Labour and Accident Compensation Corporation (ACC) is a government organization which looks after their citizens in their daily life. The New Zealand government has a special concern for Maori people, which is why we have seen Maori language used as a parallel language of English in this country. They have also transferred this to the media level by establishing a dedicated Maori channel which helps to develop their culture. The Maori ethnic group is one of the oldest indigenous people in the world, which is why most non-profitable organizations are also concerned about Maori peoples basic needs. With consideration of the above facts we have narrowed down our focus into four main sectors: Health, Education, Finance, and Language and Culture. We have used annual reports from those organizations that are involved in all of the above mentioned sectors as our data source.

An ontology can be defined as a model which represents knowledge as a set of concepts within a domain. It also captures the relationships between these concepts and the knowledge within an organization as a model. This model can then be queried by users to answer complex questions and display relationships across an enterprise. Ontology structure [22] can be represented in various ways although RDF (Resource Description Framework) [11, 6] is the most widely used presentation method and has been used to present our extracted ontology relation.

We have collected 216 annual reports from 48 New Zealand organizations which include government organizations, non-profitable private organizations, profitable organizations, and trusts. We have implemented various text mining techniques including Linked

data[20, 26], the Semantic Web[29, 9, 23], Ontology[1], and RDF (Resource Description Framework)[11, 6] . As a result we identified a lot of structural relations between organizations and Maori issues. In the appendix, Table A3, Table A4, Table A5 and Table A6 show the relations between Maori issues and organizations in RDF (Resource Description Framework) structure.

This thesis has been successfully completed accordingly. First of all, we gathered all the knowledge and information by doing a literature review on existing research work on Maori issues and text mining technologies. After that, we have specified the sources of data that are the chosen organisations and then designed a plan for development and analysis on the topic. Proceeding, we developed a software that takes the URL of annual reports as the input, processes them in 3 major steps and developed a list of ontologies on the basis of the relation between organizations and Maori issues as the output. The 3 major steps of processing are archiving annual reports with proper tracking, executing natural language processing and developing ontologies respectively. After we achieved the list of ontologies we presented them in Resource Description Framework and analysed the RDF to show the extraction from natural language.

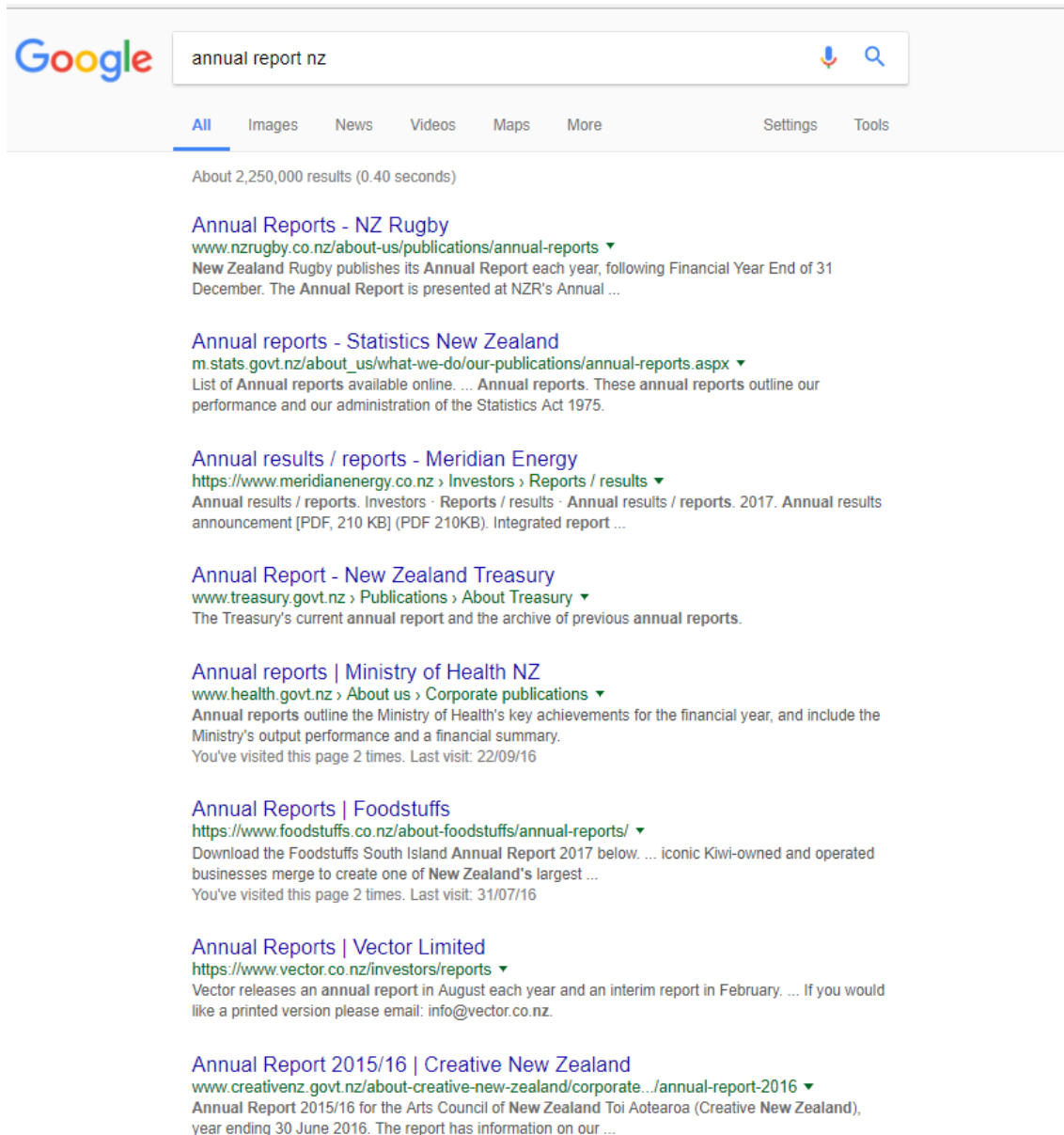


Figure 1: Screenshot of search on google with keywords “annual report nz”

2 Literature Review

After deciding on our aim we focused on gathering research. We have reviewed various studies on Maori issues and text mining which include the Semantic web, Linked data, Ontology, and RDF.

2.1 Research on Maori

A Brief Institutional Analysis of Maori Tribal Organizations Through Time [28] explores the nature of iwi through time and is structured in three parts. In this study, they focused on the institutional role and limitations of a tribal collective. They have evaluated Maori institutional arrangements during the nineteenth century and the issue of the 'iwi counterfactual'. Third, contemporary iwi were analyzed with broad conclusions drawn regarding the opportunities they pose, the challenges they face, and the alternatives available. This study provides a clear concept about the economic framework of the Maori community, the evolution of the Maori institute and, their rules and regulations.

The Ministry of Maori Development [18] is a great research work on Maori society. Maori history is explained in a very structural way. They have explained about their development in four different time frames which are The Protectorate Department (1840–1846), The Native Department (1861–1893), The Department of Maori Affairs (1906–1989) and The last 30 years from 2008 respectively. They have further discussed the rules and regulations for the Maori society and also the initiatives taken by the government for Maori development.

Maori and Welfare [19] focused on the government plan for Maori development. From this research we have discovered that the Maori people were not always over-represented in dole queues, prisons, and the courts, in high rates of gambling and alcohol addiction, youth suicide, substance abuse and smoking. Maori unemployment is discussed with data and graphical presentation's. This research has shown the initiatives taken by the government against Maori crime, single parenthood, paternalism, privatization of services, and Maori unemployment.

2.2 Text Mining

Text mining is a very important part of this research. There are a lot of text mining techniques in the current world and all text mining has different forms of expression. For this thesis, we have conducted our text mining with the Semantic web and Linked Data technology. To explain linked data we have used ontology and RDF structure. We went through a number of research studies on these technologies, such as research, on theory, on implementation and others about the tools used for these technologies.

The Semantic web helps computers to understand the meaning of a web page. The web of today is about documents whereas the semantic web is about any concept that human can think. The semantic web is not only about pointing these things out of a computer but also to let the system know how these are related to each other. There are several promising technologies that are in use today that can embed semantic and HTML documents. One of the most popular technologies is RDF. The semantic web is not about something that is going to happen in the future, it is about something that is happening today.

The Semantic Web Revisited [29] is a good study about the fundamentals of the semantic web. The historical background about the web and semantic web is described in this work. They have given a good idea about other text mining technology related to the semantic web such as, Ontology, Triple, RDF (Resource Description Framework), Universal Resource Identifiers (URI), and Web Ontology Language (OWL). They have used graphical presentation to explain the whole process. From this research we understand how to explain a normal human text in ontology.

Ontology is a way to express a sentence in triple format. Triple is the basic English grammar concept in which every line is explained in Subject - Predicate - Object form, where subject and object can be a noun, a pronoun, a concept or even an external link, and predicate is usually the verb or the concept that relates to subject and predicate. In ontology, the predicate is called Universal Resource Identifiers (URI). Associating a URI with a resource means that anyone can link to it, refer to it, or retrieve a representation of it. RDF is a technology used to represent the triple and can be expressed in two ways i.e. XML presentation and Graphical presentation. The ontologies that will furnish the semantics for the Semantic Web must be developed, managed, and endorsed by practicing communities. OWL brings us to an often quoted concern about the Semantic Web—the cost of ontology development and maintenance. In some areas, the costs no matter how large, will be easy to recoup.

An ontology can be defined as a model which represents knowledge as a set of concepts within a domain. An ontology also captures the relationships between the concepts and is a form of knowledge management. It captures the knowledge within an organization as a model and this model can then be queried by users to answer complex questions and display relationships across an enterprise. Today, people have access to more data in a single day than most people had access to in a lifetime in previous decades. The problem is, the data is found in many different forms. All of this information captured in many different formats makes it almost impossible to understand existing relationships between different data. In the current environment it is very difficult to determine how policy is captured in word documents related to business processes captured in models and how the business processes relate to data captured in the database. Data needs to be represented in a format that allows these types of relationships to be discovered as an ontology.

A Guide to Creating Your First Ontology [22] introduced new ideas and knowledge of creating ontology. Ontologies have become common on the World-Wide Web. These ontologies range from large taxonomies categorizing Web sites (such as on Yahoo!) to categorizations of products for sale and their features (such as on Amazon.com). This research has explained how one content of a domain can be used on another domain. Why would someone want to develop an ontology? Ontology explains how to share common understanding of the structure of information among people or software agents. Wine and food industry relations have been used as their domain. They have developed their ontology in taxonomic (subclass – super-class) hierarchy. Explanation about class, slot and allowed values for these slots have been discussed. We have seen a very clear view about domain and scope for developing ontology with this example. In their discussion about the scope they have shown the importance of reuse of existing ontology. They have developed top-down and bottom-up hierarchy relation for wine and food industry.

Linked Data: There are many different types of data that we use in world wide web such as images, text, spread sheets, audio, and video. Websites contain data, internal links, and external links. Websites also contain not only the text with pictures and

chart's but also links between documents. Web helps us to discover more detail about the specific subject. This technology is great achievement for human's, but computers are still in the dark. Computer's can understand what an image is, what a text is, even what a data chart is, but it is impossible for a computer to understand what is the relation between text and the image, the reason behind the image and the semantic meaning of the text. Linked data concept could be the perfect answer to all the above mentioned issues.. Linked data is linking between data ,where the data is represented in a triple form ((subject, predicate, object)). The subject and predicate in a triple are always IRIs (Internationalized Resource Identifiers).

Introduction to Linked Data and Its Life-cycle on the Web [20] has described linked data from scratch. It gives a brief over view of recent development of linked data and a clear view about life cycle of linked data. It has further discussed about benefit of linked data such as: Uniformity, De- reference ability, Coherence, Timeliness. They have discussed about RDF Data Model: Triple and graph. This research work has explained about linking data through various way like: URI. We have come to know about two algorithm related linking data: LINES Algorithm, HR3 Algorithm from this research paper. They have introduced Lined Open Data (LOD) that covers quantity and quality of linked data.

A Multi-Strategy Approach for Lexicalizing Linked Open Data [26] focused on linked data for generating natural text. This study discusses various topics about linked data such as, Lexicalization, Natural Language Generator , and DBpedia. They tried to convert a link to normal text, by using DBpedia as their data source. We can convert normal text to NLP translation and this NLP can be used to develop linked data. Triple concept can be used for linked data. . A standard triple is "Subject - Predicate - Object" oriented, where subject and object is a noun or a pronoun and predicate ia a verb . This research presents a Lexicalization pattern of triple .

There are several promising technologies that are in use today that can embed semantic and HTML documents. One of the widely used technologies is the RDF. RDF stands for Resource Description Framework which is just another way of saying that it can describe any concept or things that exists in the universe. The idea behind RDF is simple, there are three things in RDF, subject, predicate, and object. The subject refers to the concept that we are describing, the object is the concept that we are referring to with predicate and the predicate usually refers to an attribute of that particular concept. RDF Uses URI to specify the subject, predicate and object. RDF can be generated from a spread sheet relational ontology result.

Agents and the Semantic Web [9] is a very important research study of the real time implementation of the semantic web concept. The research focused on complex actions in the web. They developed their own ontology on the basis of "Agent & Service". In this research, the domain was Travel Service World which is why travel agent information was used as their data source. In this research they developed the semantic web for the relation between agent and service. From this research we understand the importance of ontology. Establishment of semantic web through ontology have been explained in this paper.. Retrieval of semantic structure from a normal text have been shown. Finally we have got a very clear view of the relation between different components in the web content.

An Ontology Design Pattern for Activity Reasoning [1] has shown how design pattern can be developed from ontology structure. They have given a brief idea about generic design pattern. It highlights the requirements, lifespan and prerequisites in order to

develop the design pattern of ontology. In this research they developed a pattern of activities. Requirements (or outcomes) of an activity and the place (or deadline) of an activity have been explained. They also discussed the the order of activities with a prerequisite activity. It further shows us how a list of ontologies from one domain on a specific point can be developed into a pattern.

For using ontologies, RDF is one of the mostly common techniques. Database Foundations for Scalable RDF Processing[11] , Using SPARQL with RDFS and OWL Entailment[6] and RDF123: From Spreadsheets to RDF[8] are excellent studies that can be used as a guide to how we can develop RDF from plain ontology. We can develop database on the basis of RDF. Spreadsheets are one of the widely used techniques to store data for humans. Spreadsheets to RDF [8] is an example of a research study which explains how we can convert a spreadsheet relation to RDF structure and how to get a spreadsheet from a set of RDF structure .

To implement the semantic web in the real world software tools are needed. Protege is a great tool developed by Stanford University. Creating Semantic Web Contents with Protégé-2000[23] is a good research study about Protege 2000. In this research paper we have got very clear vision about Protégé software. The installation procedure and usage of Protege has been clearly explained. In every step it has shown how to retrieve data from real world and where it need to be set. The actual meaning of class, data property, object property, individuals, domain and range in protege have been nicely presented. They have created class with data properties and individuals in protege and also established the relation between classes through the individuals of object properties.

A Practical Guide to Building OWL Ontologies Using Protégé' and CO-ODE Tools [10] is a nice research work that explains how we can develop OWL through protégé. This is similar to, Creating Semantic Web Contents with Protégé-2000 [23]. The study of important topics with basic knowledge of the semantic web and linked data. We can say it is an advanced explanation about Protege. This research paper highlights a few important features of Protege which are as follows : class hierarchy, OWL properties, inverse properties, functional properties, reflexive properties and Ir-reflexive properties respectively.

Visualizing Ontologies with VOWL [13] has shown how we can visualize the ontology. For doing this they have introduced useful tools called VOWL. VOWL implements two different tools, protégé VOWL and web VOWL. This research work explains about all notations that's are using in different tools. We have learned how to export protégé graphical output and web output.

Protégé-OWL Tutorial [5] is a user manual published by Stanford University. This manual contains the latest version of protege and has very informative visual presentation of protege. They have explained all the different implementation of the features of protege with the help of a restaurant domain called pizza domain.

3 Data & Methodology

3.1 Data Source

The New Zealand government has a great web resource [17] which contains a list of all organizations including government organizations, non-government and non-profitable organizations, trust, and private organizations with basic details such as, organization name, interest area, website address, main activities etc. After researching on the organization's activities we have learned that they show interest in Maori and Pacific people in various ways, such as : education, health, housing, culture, language, finance, tourism, history etc . As discussed before we have considered the importance of the government's focus and have focused on the four main sectors i.e. Health, Language and Culture, Finance, and Education.

We divided our data collection process into two steps. Firstly we collected the list of organizations. We visited their websites and collected the annual reports which are published publicly.

During the process of selecting organizations we carefully considered their main goal and activities. As our main focus was to collect data related to Health, Language and Culture, Finance and Education, we focused on organizations which have activities in these sectors. We found 48 New Zealand organizations which include ministries, district health board, television, education institute, government public service organizations, NGO's, hospitals and private organizations. We have developed a data base in appendix Table A1 for these organizations which contains four properties which are the group, name, owner and type of the organizations respectively. Here, the group defines the sector which the organization belongs to, the name section defines the organization's name, owner is the founder of the particular organization which could be the government, non-government or trust, and the type defines sub-sectors of the sectors that the organization belongs to for e.g. the Health sector holds multiple sub-sectors like district health board, ministry, hospitals, research center etc.

After developing the organization's database and analyzing their websites we noticed that most of the organizations had published annual reports for individual years. Usually annual reports are published after every financial year. In 2016, when we started collecting annual reports, the latest annual report was published in the 2015-2016 financial year. Almost all organizations had an annual report from 2008 to 2015. However, before 2008 a number of annual reports were not available online. Therefore, we decided that we will focus on the annual reports which were published between 2008 to 2015. We collected annual reports from websites of all organizations included in Table A1 in the appendix. All organizations do not have an annual report for every year. We collected 216 annual reports from these organizations and developed a data sheet in appendix Table A2 for the list of annual reports which contain organization name, published year, and the url link of the annual reports.

3.2 Methodology:

This thesis has been completed in four phases. We can refer to these phases as, Archiving phase, Knowledge gathering phase, Development phase, and Analysis phase.

Archiving phase

In this phase, web crawlers were deployed to search for publicly available annual reports and were archived in a database. This involved downloading the documents in the available formats and converting these to texts and images. We extracted texts as well as images in the form of photos and graphs. Some of the older annual reports could be scanned with the use of Optical Character Recognition (OCR), however it is envisaged that the majority of the reports have embedded texts in pdf's which can be easily extracted using text extraction API's. This process also involved extraction of photos and graphs and the corresponding captions.

Knowledge gathering phase

In this phase we gathered knowledge about various text mining techniques, tools and software development tools.

In text mining we implemented the semantic web, ontology, linked data, and RDF technology. Therefore, during the first stage we gathered fundamental knowledge about text mining technologies.

The Semantic Web is a web of actionable information; information derived from data through a semantic theory for interpreting the symbols. The semantic theory provides an account of "meaning" in which the logical connection of terms establishes interoperability between systems [29].

For developing the semantic web, linked data is a very important and useful concept. The concept of linked data introduces the process of publishing structured data which can be interlinked. This structured data is represented in the form of triples, a data structure composed of a subject, a predicate, and an object [20].

Ontology is a formal explicit description of concepts in a domain of discourse [22]. Ontology is a widely used technique to implement linked data concept. It can be developed with a lot of different techniques and tools among which RDF(Resource Description Framework) is the most widely used. This technique is used for developing the semantic web, linked data and ontology concepts

For the implementation of text mining we used several tools. We gathered information about these tools including the pros and cons and also collected research work where these tools had been used in the research.

Development phase

In this phase we developed a software that is able to download the annual report from the url and store this on the hard drive. Afterwards the software processes the annual report in different stages and finally it provides us with a list of ontologies .

For developing the software we used Java as the programming language, MYSQL as the database and Java FX as the user interface. For NLP(Natural Language Processing) we used NLP tools developed by Apache. In every aspect of the software we designed and developed specific algorithms according to requirements.

Analysis phase

In this phase we analyzed the ontologies with RDF presentation that has been completed in two different ways i.e. XML analysis and Graphical analysis. Protege was

used for XML analysis. Graphical analysis had to be done with 3 different tools which include Protege, Owl GRED and Visual Web Data. In both sections we have shown how we can extract relations in RDF structure from a normal text.

4 Ontology Development

For this research, ontology development is a key aspect. We have completed this task in two parts, developing ontologies in plain text and developing ontology relations on a spread sheet. In order to develop the ontology the designed software has been used which is able to build up plain ontologies from the annual reports . The software can perform the following tasks:

- Download annual reports from a url and store the report on a hard drive
- Convert PDF files to plain text and save this on a database and hard drive.
- NLP conversion from plain text.
- Tokenize and filter data.
- Chunking NLP.
- Develop Ontology strings.

After developing the ontologies in plain text we extracted the relations which are strongly connected between organizations and Maori issues. In the following section, we will describe the procedures in detail.

4.1 Ontology Development in plain text

In this section we will mainly discuss the software development where the end result will be ontology in plain text. We have followed the following flow chart to develop the software .

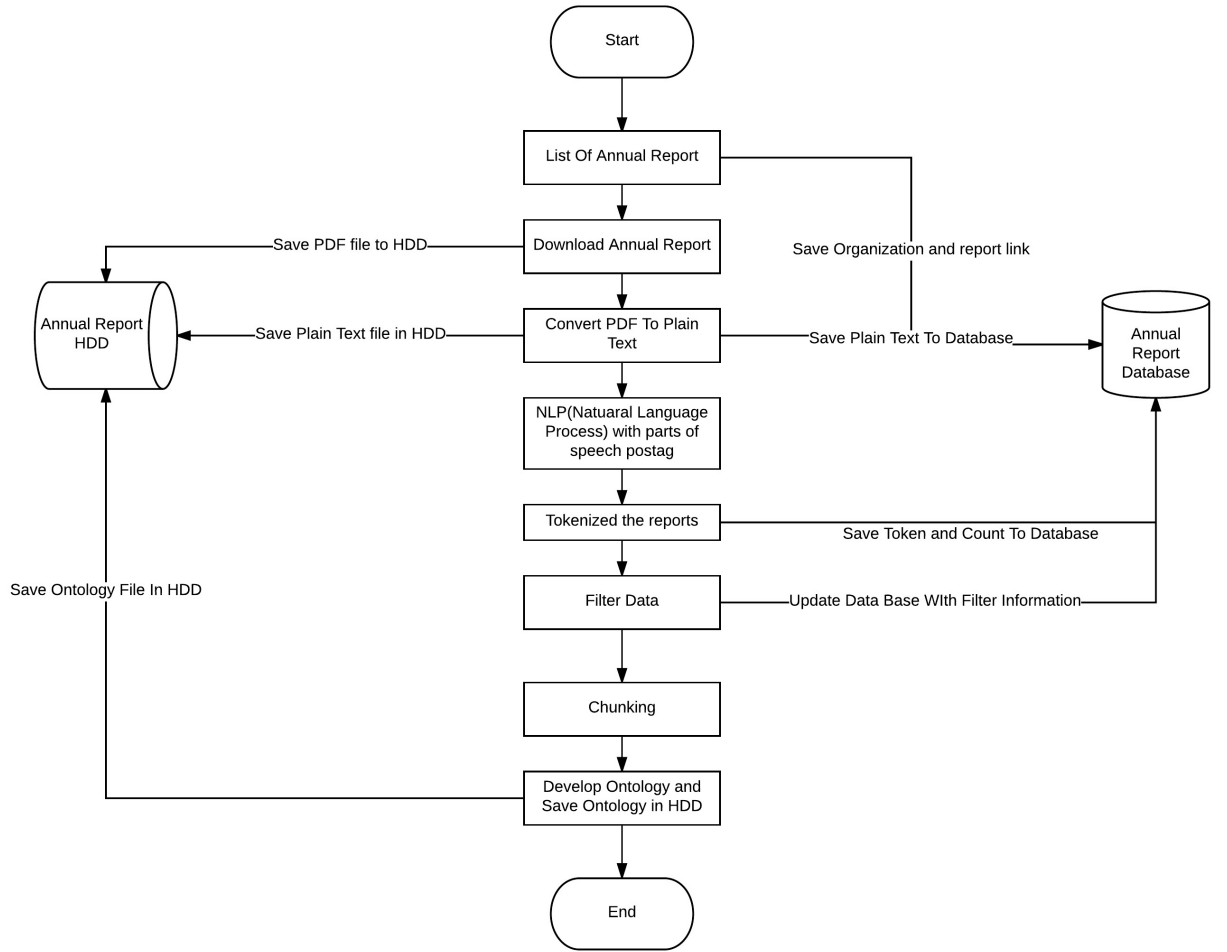


Figure 2: Development Flow

4.1.1 Development Tools

During the development phase, we had to consider two major parts : the programming language and the database. For this thesis, we needed a programming language which could perform text mining algorithms and is free of cost. There are a lot of programming languages currently available and JAVA is considered one of the best programming languages in the world. It is widely used and is an open source programming language. JAVA is able to perform text mining technology. A lot of text mining tools are available for JAVA which are free of cost. A database is required that can to manage large-scale database , is easy to use and free of cost. MYSQL is a one of the best free data base management systems which can manage more than 256TB data base. With considering these factors we decided to use JAVA as our programming language and MYSQL as our database.

Apache provide a java library called OPENNLP that can perform almost all text

mining techniques related with NLP. Open NLP is a very easy and useful library for java developers and supports most of the common functions related to NLP such as, tokenization, part-of-speech tagging, parsing, and chunking. Open NLP has great documentation and a manual[21] for java developers where users can easily attain resources for using the library. Part-of-speech tagging and chunking has been used for the NLP process in this research.

Part-of-speech tagging Open NLP has a great tool called Part-of-speech tagging. This converts a plain text to a corpus text according to particular parts of speech such as nouns, pronouns, adjectives, verbs, adverbs, prepositions, conjunctions and interjections. Open NLP uses Penn English Treebank [3] as corpus.

Here is an example of a parts-of-speech tagger where NNP is, Proper noun, VBZ: Verb, 3rd person singular present, DT: Determiner, TO: to, VB: Verb, base form, NN: Noun, singular or mass, JJ: Adjective.

Sample Input:

ACC is a Crown entity, set up by the New Zealand Parliament to provide comprehensive, 24-hour,

Sample Output:

ACC_NNP is_VBZ a_DT Crown_NN Pentity,_NN set_VBD up_RP by_IN the_DT New_NNP Zealand_NNP Parliament_NNP to_TO provide_VB comprehensive,_NN 24-hour,_JJ

Chunking Chunking is one of the greatest features of open NLP which converts the result of a parts-of-speech tagging in to another format by combining it with chunked parts of speech,

For example, if we process parts-of-speech tagging on the following text “Wellington is the capital of New Zealand” we get the following output:

Wellington_NNP is_VBZ the_DT capital_NN of_IN New_NN Zealand_NN

If checked carefully, we can see that New and Zealand are being treated as two different words whereas they actually are one meaningful word. Chunking helps in solving these kind of situational issues and below is an example of it:

Wellington_NNP is_VBZ the_DT capital_NN of_IN (New Zealand) _NNP

4.1.2 Download annual report and convert to plain text

All pdf's of annual reports have been downloaded from the URL (Table 2) and saved on a hard drive, and then in the database. After downloading and saving the annual reports, the pdf files have been converted in to plain text files and saved in the hard drive and database Pdfbox[2] was used for converting the pdf files to plain text. This library is able to convert all the text in pdf but is unable to convert any image or chart as text. The following algorithm has been followed in order to complete the process:

Algorithm 1 Download annual report and convert to plain text

Require: $List_{OfAnnualReport} < -allannualreportFromTableA1$

```
for each annual report from ListOfAnnualReport do
  organization <- Find Organization of current annual report
  pdf file <- Download Pdf from url with pdfbox
  plain text file <- convert pdf file to plain text with pdfbox
  save pdf file in Hard Drive
  save plain text in data base
end for
```

Execute the algorithm and Result: After implementing the above algorithm we get all the annual reports of Table A1 as both plain text and pdf which are saved in the hard drive. The plain text is then also saved in the database. Below is an example of a pdf and converted plain text:

The figure in next page is a sample of a pdf page after it was converted into plain text.

Funding Round

The HRC's main contestable funding round was conducted between November 2007 and June 2008. A robust and clearly defined policy managed real or perceived conflict of interest for those involved at the various levels of the funding decision process. Funding decisions were informed both by scientific merit, judged through a peer review process, and fit with health research priorities. Criteria for the scientific assessment were:

- health significance;
- scientific merit;
- design and methods, and
- expertise and track record of the research team.

These criteria were used by the national and international referees who reviewed research proposals and by one of the HRC's eight Science Assessing Committees for those proposals which progressed to full review. The HRC's peer review process meets international best practice standards. Following ranking of proposals based on their scientific merit by the HRC's Research Committees, fit to health research priority was reviewed by the HRC's Grant Approval Committee (a sub-committee of the HRC's Board made up of the Chairs of the Research Policy Advisory Committee, Biomedical Research Committee, Public Health Research Committee, Maori Health Committee and Pacific Health Research Committee) and their recommendations on proposals to be funded were submitted to the Board for approval. The Grant Approval Committee considered health research priority based on:

- relevance to HRC research portfolio priorities;
- relevance to HRC's priority populations;
- contribution to workforce recruitment and/or retention, and
- relevance to priorities of the NZ Health Strategy, NZ Disability Strategy, He Korowai Oranga, The Maori Health Strategy and MoRST's Strategy, Vision Mātauranga.

Successful research providers negotiated the details of their contracts from May 2008 for initiation after 1 July 2008.

Funding Round Outcome

The 2007-2008 Funding Round was competitive with a very high standard of research proposals submitted for consideration. The 2008 budget provided a welcome funding injection of \$3M per annum for the next four years. However, significantly more research was judged as worthy of funding than could be supported through the available funds. A reality of the health research environment is that costs of research are rising significantly, driven in part by the increases in academic staff salaries made possible through increased Government funding to the tertiary sector. Analysis of the costs of projects funded by HRC shows that there has been an average increase of 33% over the last four years, with a 48% increase over the same period for biomedical and clinical research projects.

Of the \$66.9M allocated for expenditure over the next three years, a total of \$35.5M went to biomedical and clinical research contracts, \$28.0M to public health research and \$3.4M to Maori health research contracts. The University of Auckland and the University of Otago received new contracts worth \$24.7M and \$23.3M, respectively. Other institutions received a total of \$18.9M.

Details of the successful new contracts awarded in each of the categories are set out on pages 71 to 83. Some of the key points are summarized in the following sections.

The output of the conversion is :

"11 Funding Round The HRC's main contestable funding round was conducted between November 2007 and June 2008. A robust and clearly defined policy managed real or perceived conflict of interest for those involved at the various levels of the funding decision process. Funding decisions were informed both by scientific merit, judged through a peer review process, and fit with health research priorities. Criteria for the scientific assessment were: • health significance; • scientific merit; • design and methods, and • expertise and track record of the research team. These criteria were used by the national and international referees who reviewed research proposals and by one of the HRC's eight Science Assessing Committees for those proposals which progressed to full review. The HRC's peer review process meets international best practice standards. Following ranking of proposals based on their scientific merit by the HRC's Research Committees, fit to health research priority was reviewed by the HRC's Grant Approval Committee (a sub-committee of the HRC's Board made up of the Chairs of the Research Policy Advisory Committee, Biomedical Research Committee, Public Health Research Committee, Maori Health Committee and Pacific Health Research Committee) and their recommendations on proposals to be funded were submitted to the Board for approval. The Grant Approval Committee considered health research priority based on: • relevance to HRC research portfolio priorities; • relevance to HRC's priority populations; • contribution to workforce recruitment and/or retention, and • relevance to priorities of the NZ Health Strategy, NZ Disability Strategy, He Korowai Oranga, The Maori Health Strategy and MoRST's Strategy, Vision Mātauranga. Successful research providers negotiated the details of their contracts from May 2008 for initiation after 1 July 2008. Funding Round Outcome The 2007-2008 Funding Round was competitive with a very high standard of research proposals submitted for consideration. The 2008 budget provided a welcome funding injection of \$3M per annum for the next four years. However, significantly more research was judged as worthy of funding than could be supported through the available funds. A reality of the health research environment is that costs of research are rising significantly, driven in part by the increases in academic staff salaries made possible through increased Government funding to the tertiary sector. Analysis of the costs of projects funded by HRC shows that there has been an average increase of 33% over the last four years, with a 48% increase over the same period for biomedical and clinical research projects. Of the \$66.9M allocated for expenditure over the next three years, a total of \$35.5M went to biomedical and clinical research contracts, \$28.0M to public health research and \$3.4M to Maori health research contracts. The University of Auckland and the University of Otago received new contracts worth \$24.7M and \$23.3M, respectively. Other institutions received a total of \$18.9M. Details of the successful new contracts awarded in each of the categories are set out on pages 71 to 83. Some of the key points are summarized in the following sections."

4.1.3 Modified Plain Text:

In our research, case sensitiveness was ignored. All our text have been modified to be in lower case. After converting to lower case we have carefully observed the plain text and have identified some words and symbols which hold the same meaning even after being in different formats. A data-set of words have been developed in Table 1 which has the same meaning. An algorithm was designed for modifying the document.

Used Format	Meaning
māori	maori
maori	maori
mãori	maori
?maori	maori
mâori	maori
mâori	maori
maaori	maori
māori†	maori
mãori	maori
pacific	pacific
pâcific	pacific
pācific	pacific
.	.

Table 1 : List of words that have same meaning

Algorithm 2 Algorithm for modify plain text

Require: *ListOfAnnualReportPlainText* < *−allplaintextannualreportfromdatabase*

Require: *ListOfModifiedWords* < *−allwordsfromtable5*

for each annual report from *ListOfAnnualReportPlainText* **do**

for each word from *ListOfModifiedWords* **do**

 update current annual report by replacing used word by meaning word of current word

end for

end for

4.1.4 Postage Conversion from Plain text

For converting the plain text to POSTAG Text Open NLP developed by apache was used to convert plain text to POSTAG text. We have gone through individual annual reports from the database and converted plain text to POSTAG text which was then saved in the database and in the hard drive. For performing the process the following algorithm was used:

Algorithm 3 Algorithm : Convert Plain Text To Postag

Require: *ListOfAnnualReportPlainText* < *–allplaintextannualreportfromdatabase*
for each annual report from *ListOfAnnualReportPlainText* **do**
 plainText <- plaintext of current annual report
 postagText <- Convert plainText to POSTAG Text by open NLP Library
 save postagText in Database
 save potagText in HardDrive
end for

Execute Postag Conversion Algorithm After executing the above algorithm all plain text have been received as a postag conversion in our database and hard drive. Below is a sample input and sample output of the algorithm:

Sample Input

"This report presents Capital & Coast District Health Board's (C&C DHB) performance for the year 1 July 2007 to 30 June 2008. It outlines our progress against our Statement of Intent (SOI) 2007/08, and provides a detailed account of how funding has been allocated. "

Sample Output "This_DT report_NN presents_VBZ Capital_NNP &_CC Coast_NNP District_NNP Health_NNP Board's_NNP (C&C_NNP DHB)_. performance_NN for_IN the_DT year_NN 1_CD July_NNP 2007_CD to_TO 30_CD June_NNP 2008_CD ._. It_PRP outlines_VBZ our_PRP\$ progress_NN against_IN our_PRP\$ Statement_NN of_IN Intent_NNP (SOI)_NNP 2007/08,_CD and_CC provides_VBZ a_DT detailed_JJ account_NN of_IN how_WRB funding_NN has_VBZ been_VBN allocated_VBN ._. "

4.1.5 Tokenization

Splitting a sequence of words into countable individual ones is known as tokenization. In our project when the plain text was converted to POSTAG text tokenization was done on all the annual reports line by line which was then saved in the hard drive and database.

For tokenization we used a Java library called StringTokenizer from where we get a hash map of tokens that contain words as keys. This library splits the sentence on the basis of white space. Multiple white spaces have been ignored with single spaces.

The following algorithm was followed for tokenizing the annual report:

Algorithm 4 Algorithm : Tokenization

Require: *ListOfAnnualReport* < *–allplaintextannualreportfromdatabase*

Require: *ListofAllTokens* < *–Listofalltokensfromdatabase*

for each annual report from ListOfAnnualReport **do**
 PlainText <- Plain Text of current annual report
 PlainText <- Plain Text of current annual report
 PostagText <- POSTAG text of annual report
 allTokensofCurrentReport <- get token with count of current annual report plain
 text with help of StringTokenizer
 allTokesofCurrentReportWithPostag <- get allTokensofCurrentReport with postag
 Upadte ListofAllTokens with allTokensofCurrentReport
 Save allTokensofCurrentReport in Database and Harddrive as csv format
 Save allTokesofCurrentReportWithPostag in Database and Harddrive as csv format
end for

Execute the algorithm and observe the output: After the tokenization process was executed a list of files of individual annual reports came as a result. Another result containing summary of all the reports was also generated.

Below is an example of an individual file sample from the 2008 Accident Compensation Corporation (ACC) annual report:

There are 9269 different tokens in this particular report. The tokens have been sorted in descending order on the base of count so that the significance of the resulted tokens to the report could be decided

Table 2 shows the first 5 words in descending order of the tokens.

Words	Count
the_dt	2301
of_in	1338
and_cc	1246
to_to	975
in_in	906

Table 2 : Top 5 word on basis of count

After all annual reports were executed another output was generated that contains all tokens with multiple postage and the total of all annual reports. Table 3 shows the first 5 tokens in descending order of the tokens:

Words	NLP	Count
the	DT-NNP	376456
of	IN-NN	245609
and	CC	234275
to	to	163763
in	in	127663

Table 3 : Top 5 word on basis of count

4.1.6 Filter STOP Word:

After completing the tokenization process a lot of words were found which are meaningless and they are known as auxiliary words. These auxiliary words have been ignored. They have been named as STOP words in our research and the following groups of words are considered as such:

- Only calender year e.g. 2008, 2010
- Only Numeric Value le.g. 1 , 2 , 3 , 589.65
- Month name: January, February, March, April, May, June, July, August, September, October, November and December.
- All determiner (a, an, the, am, is, are)
- List Item Marker (. , • , ■)
- All Conjunction
- All preposition
- All symbol (% & ' " .) . * + , . < = > @ A[fj] U.S U.S.S.R * ** ***

After filtering the STOP words from the main token list, the process of tokenization was again executed and the result was sorted on the basis of noun. It resulted in another data-set where all nouns with count were generated. Table 4 shows the first five nouns from the summary report after implementing the STOP word filtering.

Words	NLP	Count
health	NN-NNP	45187
new	NN	24701
financial	NNP	24372
services	NNS-NNP-NN	22989
dhb	NNP-NN-IN	15323

Table 4 : Top 5 word on basis of count

4.1.7 Finding Target Word

Since the main goal of our research is to find the relation between Maori issues and different organizations, so we started with searching for words related to them which we titled as “Target” words. .

As a result of the analysis a list of nouns were focused onto, which are related to Maori, pacific, health, education, finance and language. The list of target words shown in Table 5 will be used as a starting point for searching .

Words	Count
maori	16370
pacific	7607
language	6725
smoke	2495
income	2150
house	1250
ethnicity	1234
maoripacific	531
pregnant	450

Table 5 : List Of Target Word

4.1.8 Chunking the Postage

As discussed before, parts-of-speech tagging treats words as individuals and chunking helps in processing them and making them more meaningful by combining words such as “(New Zealand)_NNP” not “New_NNP Zealand_NNP”

For example, in the following paragraph from page 3 of the annual report of the Health Research Council (HRC) of 2008:

“The Health Research Council of New Zealand (HRC) is a Crown Entity with the primary responsibility for the administration of the Government’s investment in health research.”

After processing the parts-of-speech postag the following output is generated::

“The_DT Health_NNP Research_NNP Council_NNP of_IN New_NNP Zealand_NNP (HRC)_NNP is_VBZ a_DT Crown_NNP Entity_NNP with_IN the_DT primary_JJ responsibility_NN for_IN the_DT administration_NN of_IN the_DT Government’s_NNP investment_NN in_IN health_NN re-search_NN ._. ”

In this example, Health Research Council should mean one thing although the process outputs it as three different NNP. It was later resolved by executing the chunking process and the following output was found:

“(The) DT (Health Research Council) NNP (of) IN (New Zealand NNP (HRC)) NNP (is) VBZ (a) DT (Crown Entity) NNP (with) IN (the) DT (primary) JJ (responsibility) NN (for) IN (the) DT (administration) NN (of) IN (the) DT (Government’s investment) NN (in) IN (health research) NN (.).”

For achieving this goal, an algorithm was designed which used apache open NLP for standard chunking. We have followed the algorithm to achieve our desired chunk of sentence.

Algorithm 5 Algorithm : Chunk Postage

Require: *ListOfAnnualReportPostageText* < *−allPostagetextannualreportfromdatabase*

for each annual report from ListOfAnnualReportPostageText **do**

 ChunkedPostageText <- get chunk result from Open NLP of current postag text

 Save ChunkedPostageText in database

 Save ChunkedPostageText in hard drive

end for

4.1.9 Ontology Design

The ontologies were designed from the annual reports where we had to search through each and every line and find the "target" words as subject or predicate. The following algorithm was used to design and generate these ontologies:

Algorithm 6 Algorithm : Develop Ontology

Require: *ListOfAnnualReportChunckedPostageText* <
 –allPostagetextafterchunckingofofannualreportsfromdatabase

Require: *ListOfTargetWord* < *–alltargetwordsfromdatabase*

for each annual report from ListOfAnnualReportChunckedPostageText **do**
 lines <- get all lines of annual report
 lines <- take only those lines from lines which contains minimum one word from
 ListOfTargetWord
 ontologylist <- create empty list of ontology
 for each line from lines **do**

Require: *wordgroups* < *–allchuncksofwordsfromline*
 wordgroup <- first group of wordgroups
 ontology <- create new ontology with empty subject , predicate and object
 while wordgroup is not empty **do**
 if Parts of speech of wordgroup is Noun **then**
 if Predicate of ontology is empty **then**
 Put word group in ontology as subject
 else
 Put word group in ontology as object
 add ontology into ontologylist
 ontology <- create new ontology with empty subject , predicate and object
 end if
 end if
 if Parts of speech of wordgroup is Verb **then**
 if Subject of ontology is not empty **then**
 Put word group in ontology as Predicate
 end if
 end if
 wordgroup <- nex wordgroup from wordgroups
 end while
 end for
 for each ontology in ontologylist **do**
 if Subject of ontology does not conatian any word from ListOfTargetWord AND
 Object of ontology does not conatian any word from ListOfTargetWord **then**
 remove ontology from ontologylist
 end if
 end for
 Save ontologylist in database
 Save ontologylist in hard drive
 end for

Execute the Developed Ontology Algorithm The executed algorithm results in individual file for every annual report with a series of ontologies.

For example, in the annual report 2013 of the Capital & Coast District Health Board there is a line which contains our “target” word:

“Māori and Pacific women are significantly affected by cervical cancer.”

When the algorithm was was executed on the above line, the following output was generated:

Maori and Pacific women (Subject) __ are significantly affected (Predicate) __
Cervical Cancer (Object)

4.2 Developing an Ontology in a Spread Sheet

After all the above processes have been successfully executed, each and every annual report was saved in the hard drive as individual text file which contains a raw format of a series of ontologies.

In the list of ontologies there are some complex sentences with multiple meanings. Sometimes the subject or object is itself an ontology. In this situation the ontology was broken into multiple ontologies.

For example, “Health Research Council (Subject) - have experienced (Predicate) - Maori People are effected by chemical related illness (Object)”.

Here we can see the object “Maori People are effected by chemical related illness” is itself an ontology where we can make “Maori People (Subject) - are effected (Predicate) - by chemical related illness (Object)”

We have broken this object and got total two ontologies:

Health Research Council (Subject) - have experienced (Predicate) - Maori illness (Object)

Maori People (Subject) - are effected (Predicate) - chemical related illness (Object)

After simplifying the complex sentences, every individual ontology have been studied through and a series of ontologies have been developed which are related to organizations . Four spread sheets were derived from these ontologies for each group of data-sets. The following relational spread sheets were developed:

- Spread sheet for health sector: Table A3 in appendix
- Spread sheet for education sector: Table A4 in appendix
- Spread sheet for language and culture: Table A5 in appendix
- Spread sheet for finance: Table A6 in appendix

5 Data structure & RDF development

After the relations in the spread sheet were developed, we realized that a each individual ontology consists of both data stucture and relational structure. Proceeding further we have discussed data structure and develop RDF from relational structure.

5.1 Data Structure

Various structures of subject, object and predicate were derived from the spread sheets (Table A3, Table A4, Table A5 & Table A6). These arecalled classes. All classes have some attributes and one class is related another. As previously mentioned our main focus was to find the relation between organizations and Maori issue. We have discovered a number of organizations have departments which have involvement with Maori issues and it has been reflected on a group of people. With these considerations all structures about organizations and their internal department with physical addresses were selected. From these concepts a UML class diagram was developed which is as follows:

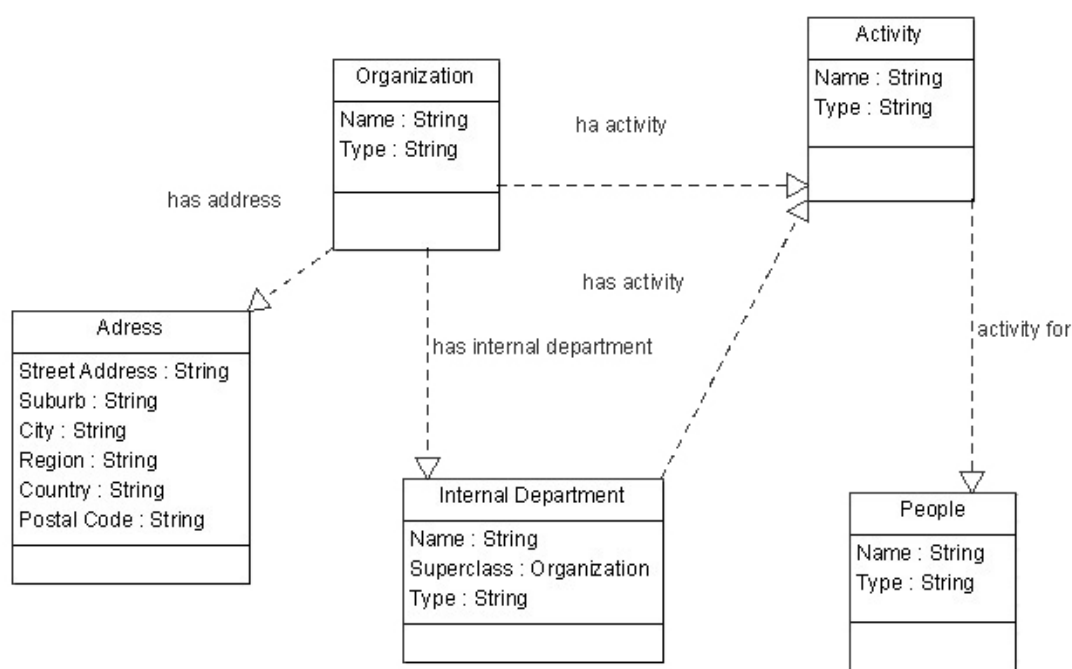


Figure 4: UML presentation of classes

Organization Organizations in the annual reports have been identified as an instance of organization class. These organizations have many internal departments, different types of activity as well as a physical location. The organizations were analyses and categorized according to their type. The Organization type has two properties, Category Basis and Categories. The following organization types were identified: :

Category Basis	Categories
Maori	Maori Organization , Non Maori Organization
Section	Health , Language & Culture , Education and Finance
Ownership	Government , Public limited , Private and Trust

Internal Department Internal department is a sub set of organizations. These internal departments are a result of projects, groups, schema with a specific goal or activities for Maori or Pacific people.

Address Address is basically a physical address which contains a region, city, suburb, street address and postal code.

Activity From the output, all objects were considered as an activity except for some objects such as “is”, “is part of” etc. We have categorized the activities into the following different categories.

Category Basis	Categories
Maori	Maori Related , Non Maori Related
Section	Health , Language & Culture , Education and Finance

People People are basically most of the objects where they have been categorized according to activities executed on them by organizations and internal departments, and have classified them as people class which has two properties i.e. Name and Type.

5.2 RDF Development

According to the spread sheets (Table A3, Table A4, Table A5 & Table A6) there are a lot of ontologies stored as plain structure. This structure is not good enough to use in a query. RDF structure is a widely used and popular structure to represent ontologies that can be queried . To develop RDF from a table structure ontology we used three tools i.e. Protégé, Owl GRED and the Visual Data Web. All tools are able to provide an XML and visual presentation of ontologies .

Protégé[27] is a widely used ontology tool developed by Stanford University and there are a lot of researchers using this tool. It is an open source, customizable desktop software. Stanford university made protege 100% free of cost for researchers. It can be used in any operating system as protege is a platform independent software. One of the best things about protege is that there is a huge documentation[27] and support team[30]. The plugging library is large and every day new plugging is added to it's database. Currently more than 30,000 people are using this tool for their thesis. Protege provides various formats of output such as, xml, owl, image etc. It is therefore very easy to connect with other devices or software as part of a complex system.

The Visual data web[4] is a web application where users have to provide an owl file as input and a graphical presentation of the owl file is generated. The main advantage of this tool is that it is a cloud system. On the other hand the drawback is to provide an owl file. Therefore it is a good idea to use “visual web” after protege output . As a result a system can be developed which will be able to share the output on the cloud. The Visual web can export the visual presentation in various formats such as, JPEG,

SVG and PNG. These tools are able to provide the statistics about class, data property, object property and individuals.

Owl gred web[7] is a web and desktop application where an owl file needs to be inputted and a graphical presentation can be generated as output. Although it is desktop and web application, it comes with a limitation that is we have to put owl file as inputs for Owl gred web. Can you elaborate? In addition it has some special feature that is amazing. This tool can provide us grid view and tree view of relations which is very useful in analyzing ontologies.

After combining these three tools we have developed a unique system that can produce RDF structure from spreadsheet ontologies, analyse them and publish it on the web with various types of presentation.

RDF has been created using protégé which is a really useful tool [27]. In protégé it is mandatory to develop four concepts to complete a RDF structure which are Class, Data property, Object property and Individual. There are two main naming conventions in each section: Duplicate names are not allowed and there is no space allowed in the name. The four concepts to complete a RDF structure are discussed below:

Class

In protégé each object type is known as class. In this thesis five different classes were created, including Organizations, InternalDepartment, Address, Activity and People.

Data properties are the properties of class. For example the properties of Address class are, StreetAddress, Suburb, City, Region, Country and PostalCode.

Object property is the relationship between two classes. Every relationship has a domain and range, where one relation can have multiple ranges. For example, every organization has an address, therefore there will be a relation between organization class and address class. For this relation an object property was created called “has address” where domain will be the organization class and range will be the address class.

Individual is an instance of class. An individual can assign with multiple classes and they are asserted with object properties and data properties.

6 RDF analysis

After the RDF ontology was developed using protégé from the spread sheet an OWL file is executed which contains xml presentation of RDF.

For the analysis of the RDF data from the **Health Research Council** was used. The Health Research Council has published annual reports from 2008 to 2015. The RDF structure was analyzed with XML Analysis and Visual Analysis.

6.1 RDF XML Analysis

After completing the RDF development in protege there is a owl file generated. This owl file contain all classes and relations in xml format. The Health Research Council has a number of relations related to Maori issues. For xml analysis we have choosen "Has Address" and "Contributing" to explain the relations in xml format as "Has Address" is a relations that is not connected with Maori issues and "Contributing" is one of relations that are strongly connected with Maori issues.

Has address The following address was found from Health Research Council annual report :

"Physical Address: Level 3 , 110 Stanley Street , Grafton, Auckland 1010"

The following XML presentation is a result of RDF structure extracted from the above sentence

1. `<owl:ObjectProperty rdf:about="url#hasAddress">
<rdfs:domain rdf:resource="url#Organization"/>
<rdfs:range rdf:resource="url#Address"/>
</owl:ObjectProperty>`
2. `<owl:NamedIndividual rdf:about="url#Health_Research_Council">
<rdf:type rdf:resource="url#Organization"/>
<hasAddress rdf:resource="url#Health_Research_Council_Address"/>
<Name rdf:datatype="url#string">Health Research Council</Name>
</owl:NamedIndividual>`
3. `<owl:NamedIndividual rdf:about="url#Health_Research_Council_Address">
<rdf:type rdf:resource="url#Address"/>
<City rdf:datatype="url#string">Auckland</City>
<PostalCode rdf:datatype="url#string">1010</PostalCode>
<StreetAddress rdf:datatype="url#string">Level 3, 110 Stanley St, Grafton</StreetAddress>
</owl:NamedIndividual>`

From the above XML presentation, the following relations have been extracted::

Relation no : 1

- Relation has a url
- Relation Name **hasaddress**
- The relation between **Organization** and **Address**

Relation no 2:

- Relation has a url
- Relation Name: **Health Research Council**
- Health_Research_Council is an **Organization**
- Health_Research_Council has a relation called **hasaddress** that is related to **Health_Research_Council_Address**

Relation no 3:

- Relation has a url
- Relation Name: **Health_Research_Council_Address**
- **Health_Research_Council_Address** is an **address**
- **Health_Research_Council_Address** has some properties (City: Auckland, Postal Code: 1010, Street Address: Level 3, 110 Stanley St, Grafton)

Contributing

From the annual report of Health Research Council in 2015 the following sentence was identified where there is a word called “Maori” :

“Health Research Council Contributing to Maori health gains through Maori research that upholds rangatiratanga”

The following relation can be derived from the above sentence:

- 1.<owl:ObjectProperty rdf:about="url#Contributing">
<rdfs:domain rdf:resource="url#Organization"/>
<rdfs:range rdf:resource="url#Activity"/>
</owl:ObjectProperty>
- 2.<owl:NamedIndividual rdf:about="url#Health_Research_Council">
<rdf:type rdf:resource="url#Organization"/>
<Contributing rdf:resource="url#Maori_Health_Gain"/>
</owl:NamedIndividual>

From these RDFs we can describe two OWLs where each OWL contains the information about relation as follows: :

Relation no: 1

- Relation has a url
- Relation Name: **Contributing**
- The relation between **Organization** and **Activity**

Relation no 2:

- Relation has a url
- Relation Name: **Health Research Council**
- Health_Research_Council is an **Organization**
- Health_Research_Council has a relation called **Contributing** that is related with **Maori_Health_Gain**

6.2 RDF Visual Analysis

After analyzing the RDF XML structure the ontologies were analyzed in a graphical presentation. The Health Research Council data was used as a domain for class and relation visual analysis. For the visual analysis Protégé [27], Visual data web [4] and OWL gred [7] were used as analysis tools . We have analyzed class analysis and relations analysis for visual analysis.

6.2.1 Class analysis

An overview of class structure has been analysed from two different tools. In the following sections the structure of class will be explained on the basis of visualization:

In Protégé [27] there is a tool called OWLviz where there is an overview of the whole class structure . It only shows the hierarchy of dependencies not the relation between classes. . In Protégé every structure is a part of master structure that is called 'Thing'.

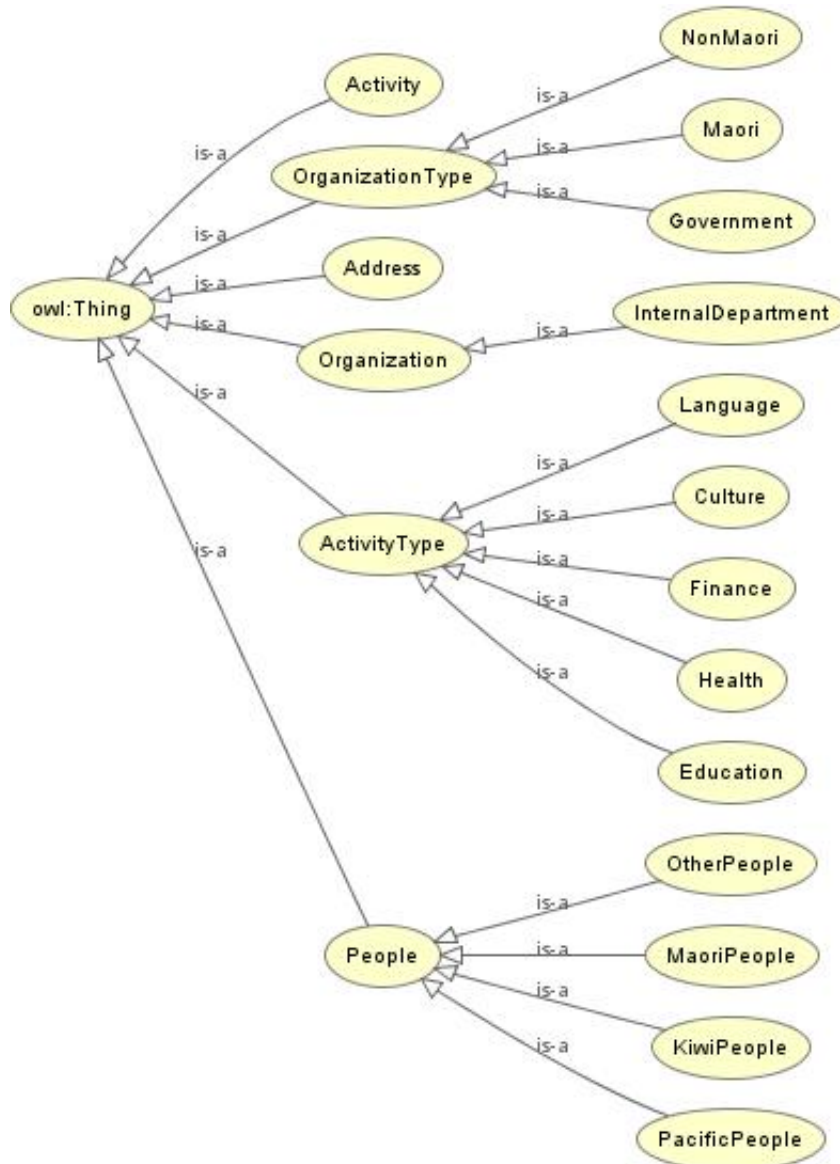


Figure 5: Class Structure in Protege[27] Presentation

From the above figure we have seen thing is the super class of every thing. Then there are 6 individual class called : Organization Type, Organization, Activity Type, Activity, Address, People. Next stage we have got subclass of these classes. From this figure we have got the following hierarchy :

- **Organization:** Organization has a subclass called **Internal Department**
- **Organization** Type: Maori, Non-Maori, Government where Maori and Non-Maori is a private organization type
- **Address:** This does not have a subclass
- **Activity** Type: Language, Culture, Finance, Health & Education
- **Activity:** This does not have a sub class
- **People:** Maori People, Pacific People, Kiwi People and Other People

The Protégé view only shows the hierarchy structure of the class and The Visual data [4] shows the class structure along with relation between classes. The following Figure shows the over view of class relation .

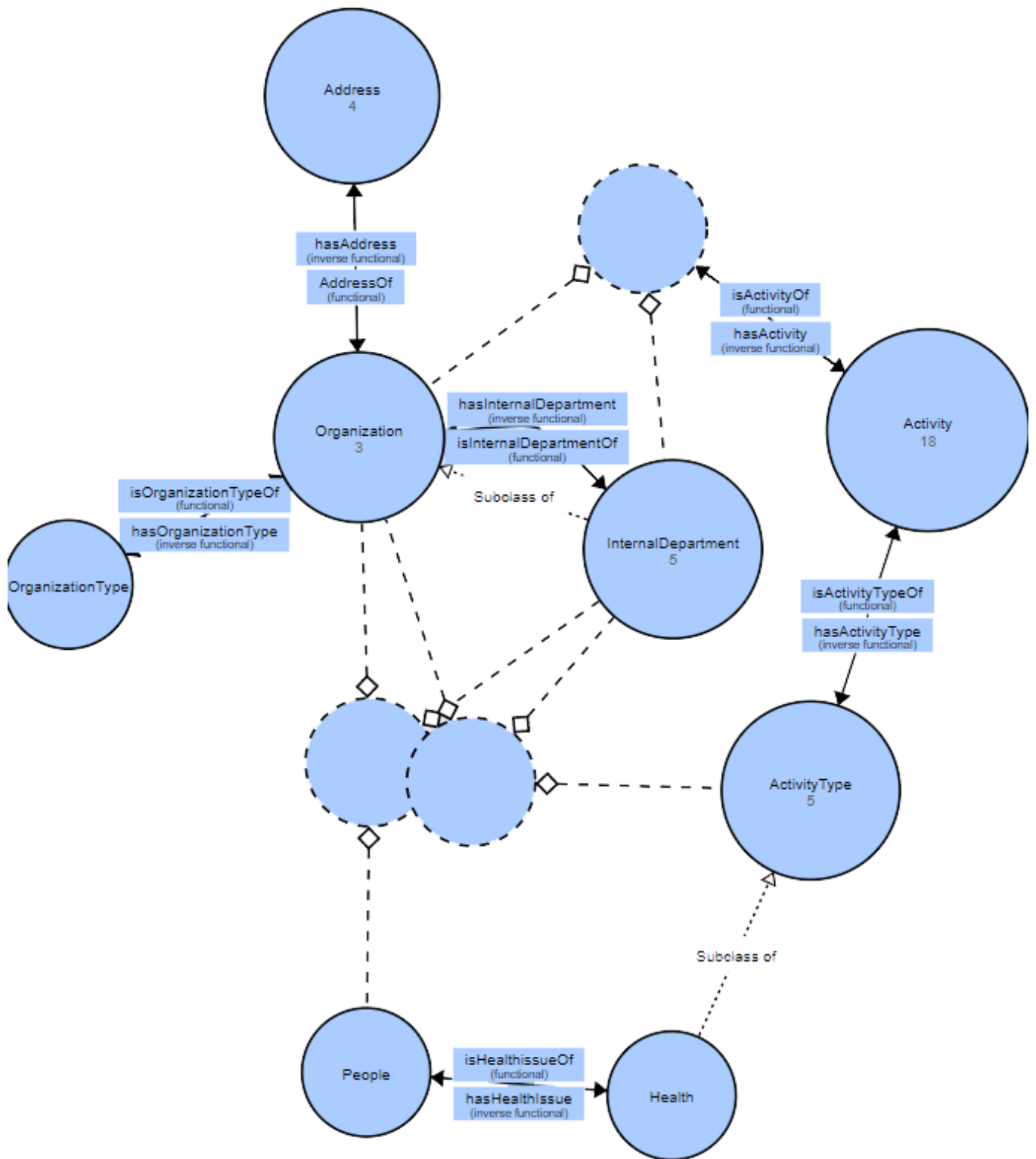


Figure 6: Class structure in Visual data web [4]

From the above figure we have seen that classes are related with other classes through relations. The following relations from the class structure have been identified:

- **Has Organization Type:** **Organization** is related with **Organization type** with the relation called **hasrelation**.
- **Has Address:** **Organization** is related with **Address** with the relation called **hasaddress**
- **Has Internal Department:** **Organization** is related with **Internal Department** with the relation called **hasinternaldepartment**
- **Has Activity Type:** **Activity** is related with **Activity Type** with the relation called **hasactivitytype**
- Organization is connected with activity for various activities. For the Health Research Council 24 activities related with Maori topics were found.

6.2.2 Relation Analysis

In Table A2 there are a number of relation from Health Research Council related to Maori issue. The relations have been explained in two steps. The relation has been explained from a compact view of relations that is produced by OWL gred[7] followed by explanations of individual relations . In this section we have shown how a normal sentence can be visualized as a relation between organizations and maori issues. Protégé[27] was used to explain individual relations.

Following is a compact view of relations from Heath Research Council by OWL gred:

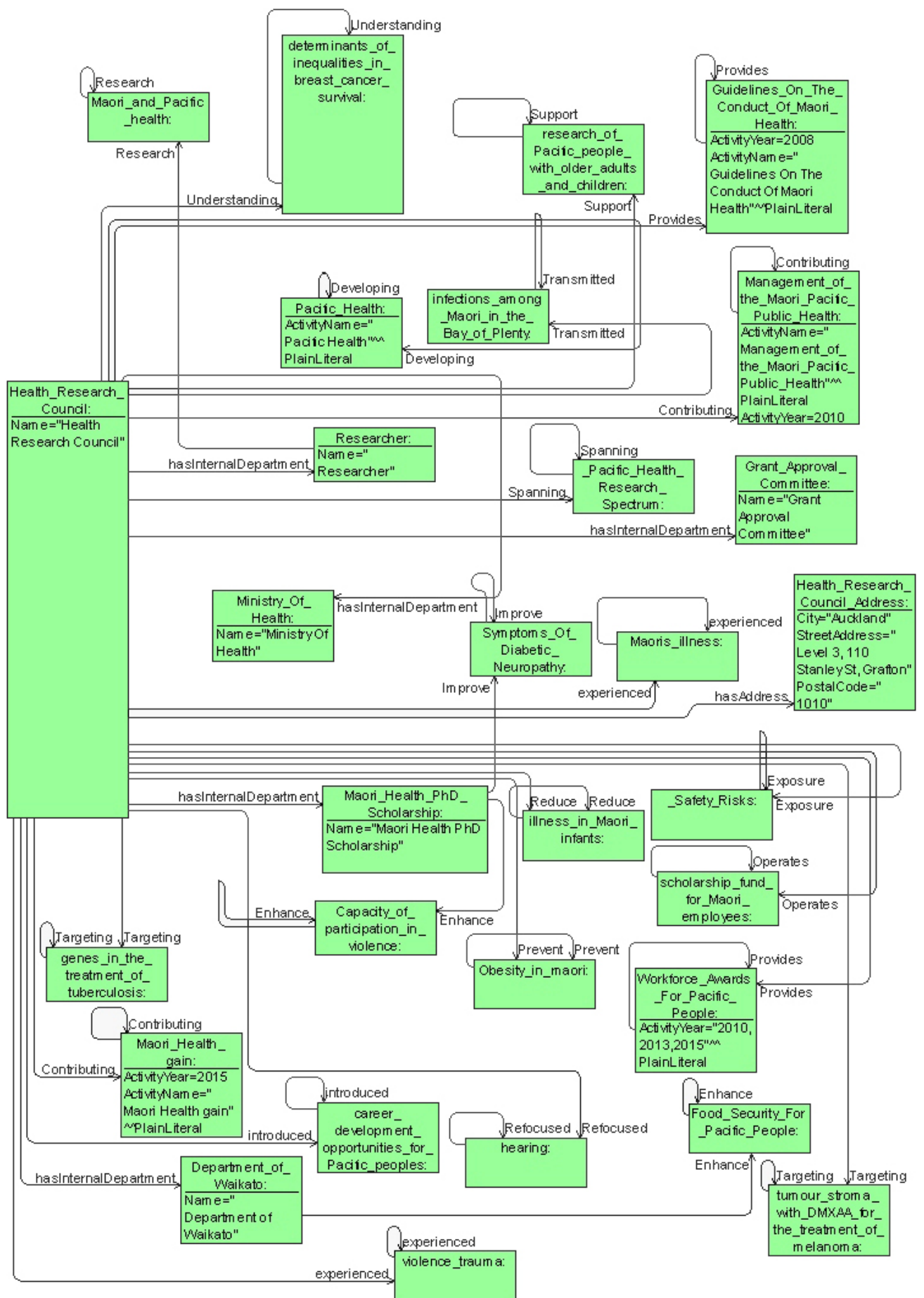


Figure 7: Relation Over view from Owl grid[7]

According to the figure above, Health Research Council has different types of activi-

ties with different range. The Health Research Council has an address called the health research council address. The Health Research Council has different internal departments which are, Maori Health PhD Scholarship, Department of Waikato, Grant Approval Committee, Investment health services. The Health Research Council has a number of activities which are strongly related to Maori issues.

The relations related to Maori Issues have been extracted as discussed previously, the predicates have been identified as the “title of the relations” and have been explained below with the help of protege ontograph tools:[27]

Relations with “Contributing” It was found in the sentences, “The Health Research Council Contributing to Maori health gains through Maori research that upholds rangatiratanga (Annual report year: 2012)” and “The Health Research Council Contribute to building capacity and capability in the health through its involvement in the management of the Maori Pacific Public Health (Annual report year: 2014)”:

After executing the RDF structure from the above sentences the following relations were derived:

Health Research Council (Subject) - Contributing (Predicate) - Maori health gains (Object), and Health Research Council (Subject) - Contribute (Predicate) - Management of the Maori Pacific Public Health (Object)

Following is a visualization of the implemented relations through the ontograph tools of protege

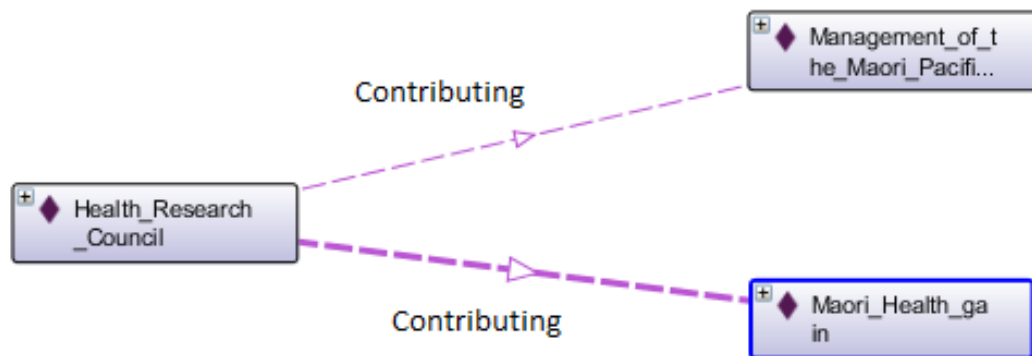


Figure 8: Visualization of Relation : **Contribute**

Relations with “Provides”: It was found in the sentences, “HRC provides guidelines on the conduct of Maori health and Pacific health research (Annual report year: 2009,2010)” and “The HRC providing workforce awards for Pacific(Annual report year: 2014)”

After executing the RDF structure from the above sentences the following relations were derived:

HRC (Subject) - Provides (Predicate) - Guidelines on the Conduct of Maori health (Object)

HRC (Subject) - Provides (Predicate) - Workforce Awards For Pacific (Object)

Following is a visualization of the implemented relations through the ontograph tools of protege

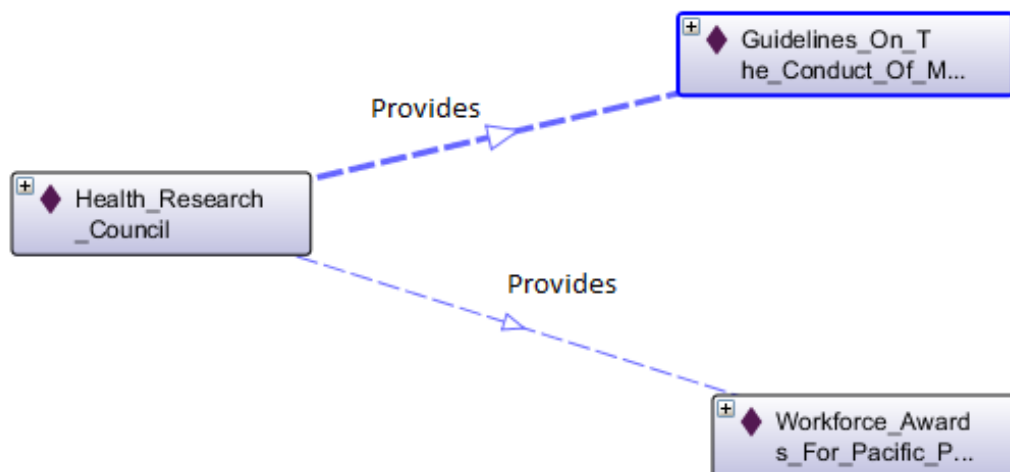


Figure 9: Visualization of Relation : **Provides**

Relations with “Developing”: This sentence “HRC are developing a Pacific mental health intervention (Annual report year: 2012)” contains the predicate “developing” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC (Subject) - Developing (Predicate) -Pacific mental health intervention (Object)



Figure 10: Visualization of Relation : Developing

Relations with “Prevent”: This sentence “HRC Ref: 08/528 are improving sleep quality and duration to prevent obesity in Māori (Annual report year: 2010)” contains the predicate “Prevent” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation

HRC (Subject) - Prevent (Predicate) - Maori (Object)

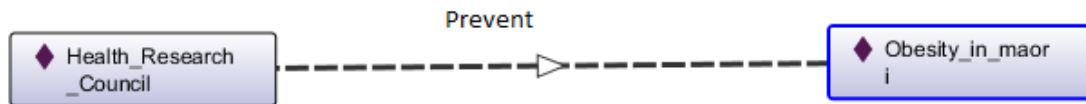


Figure 11: Visualization of Relation : Prevent

Relations with “Experienced” This sentence “Dr Cherryl Smith of the HRC experiences of Maori illness affected by chemical (Annual report year : 2009)” contains the predicate “Experienced” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC (Subject) - Experience (Predicate) - Maori (Object)

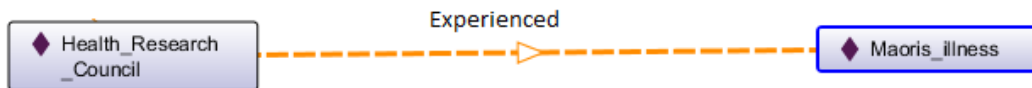


Figure 12: Visualization of Relation : experienced

Relations with “Introduced”: This sentence “The HRC introduced career development opportunities for Pacific people wanting to pursue careers in health research (Annual report year: 2015)” contains the predicate “Introduced” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC (Subject) - Introduced (Predicate) - Career Development Opportunities For Pacific peoples (Object)

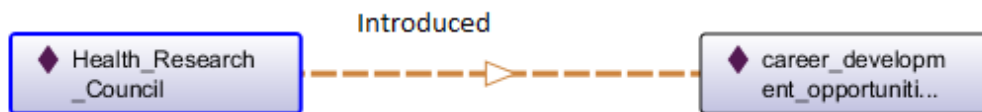


Figure 13: Visualization of Relation : Introduced

Relations with “Spanning”: This sentence “The Health Research Council spanning the biomedical, clinical, health services, public health, Māori and Pacific health research spectrum were supported (Annual report year : 2014)” contains the predicate “Spanning” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

Health Research Council (Subject) - Spanning (Predicate) - Maori and Pacific health research spectrum (Object)

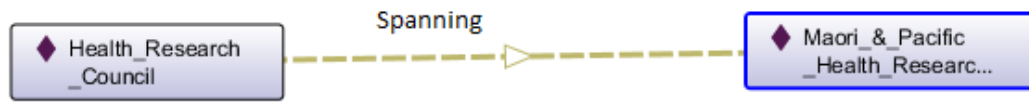


Figure 14: Visualization of Relation : Spanning

Relations with “Support”: This sentence “The HRC supports research on Māori, Pacific people, people with disability, older adults, children and youth (Annual report year : 2009)” contains the predicate “Support” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC(Subject) - Support (Predicate) - Research of Maori, Pacific peoples (Object)



Figure 15: Visualization of Relation : Support

Relations with “Reduce”: This sentence “Dr Natalie Walker, HRC ref: 09/626 A family tobacco control program to reduce respiratory illness in Maori infants (Annual report year: 2009)” contains the predicate “Reduce” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC(Subject) - Reduce (Predicate) - Illness In Maori Infants (Object)

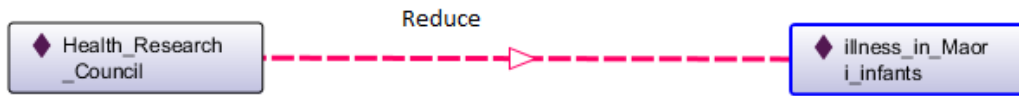


Figure 16: Visualization of Relation : Reduce

Relations with “Transmitted”: This sentence “Dr Clive Aspin , HRC Ref: 08/377 86 is monitoring sexually transmitted infections among Maori in the Bay of Plenty (Annual report year: 2009)” contains the predicate “Transmitted” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC(Subject) - Transmitted (Predicate) - Infections Among Maori (Object)

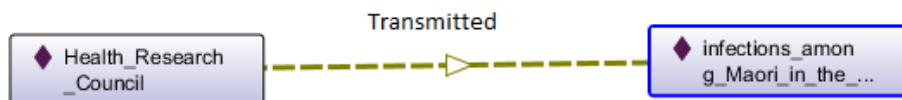


Figure 17: Visualization of Relation : Transmitted

Relations with “Refocusing”: This sentence “Ms Kirsten Smiler, the HRC Ref: 06/420 are refocusing successful interventions for Maori deaf/hearing impaired children (Annual report year: 2009)” contains the predicate “Refocusing” which has been used as a relation and after constructing the RDF structure from it we can derive the following relation followed by a visual presentation of the relation.

HRC(Subject) - Refocusing (Predicate) - Interventions for Maori deaf/hearing(Object)

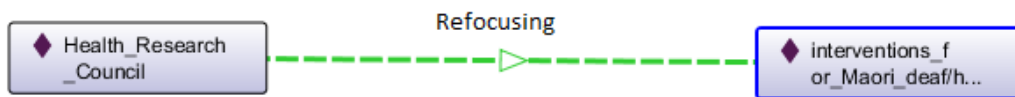


Figure 18: Visualization of Relation : Refocusing

7 Discussion & Conclusion

The findings of this thesis clearly suggests that there is a strong relation between different organizations in New Zealand and Maori people. They have a huge focus on Maori and pacific people. As discussed before, the main focus of this thesis was to mine the relation between different organizations and Maori people using Ontology technology and establish relations in RDF structure.

Ontologies have been developed from the relations and were represented in RDF structure where majority of the RDF representations contain the organizations as the "subject", standard verb as the 'predicate' and any concept that is strongly related with Maori and pacific people as the 'object'.

The data for this study consisted 216 annual reports between the period 2008 to 2015 from 48 different New Zealand organizations which containing more than 1.5 million words. A systematic approach was used to represent the information contained in the annual reports as an ontology. The information was represented at the component level using the RDF which could then be analyzed using using a variety of RDF tools such as Protégé , Visual data web and OWL gred.

According to Table A3, A4, A5 and A6, most organizations have good concern about Maori and Pacific people. These organizations have developed a large number of activities for the Maori and Pacific people. The health sector itself contains 175 unique activities that are strongly connected to Maori and Pacific people, the education sector has 75 activities, language and culture has 35 different types of activities and financial sector has 46 activities respectively.

The developed software produced a lot of ontologies including correct and incorrect relations. Some results showed that the relations have been developed fulfilling the rules of ontology which states that target word is contained in the subject or the object of the sentence but it does not relate the organizations to Maori people in any way, and in many cases in does not even make any sense. For instance, the annual report of Heath Research Council published in 2008 contains a relation "Maori(subject) __ are(Predicate) __ number of(Object)" where the subject contains target word "Maori" but the relation is not related to Health Research Council. Here, the meaning of "number of" is not clear and its relation to organizations is also uncertain. The main database contains all correct and incorrect relations and the report published only correct relations in Table A3, A4, A5 and A6.

The ontologies, in this report, have been presented as RDF structure, RDFs structure has been analyzed by XML presentation and visual presentation where we have explained the interpretation of a natural human language to relational structure. In RDF analysis section there are a series of examples with graphical presentation from the Health Research Council's annual reports.

The analyzed result shows that the ontologies can be shared among software, human and other automation applications. For example, the activity "fund" can be explained as an activity found from different annual report of different organizations e.g. "West Coast District Health Board - fund - Maori health improvement", "Taranaki District Health Board - funded - Maori health inequalities" and "Maori Language Commission - Funding - Community Based Language Initiatives" where the organizations are West Coast District Health Board, Taranaki District Health Board from health sector and Maori Language Commission from Language and Culture sector. The above relations show that a link could be developed among these three organizations where the relation

is “fund” and these three organizations can share the information through the relation.

Reuse of information could be one of the greatest achievement of this research work. The organizations can reuse the data already published by them or by other organizations. As an example the relations called “has address” is published in every annual reports. From the ontology structure of the relation, it can be used in the later versions of the annual reports, in order to track the location of the organizations. The public directories, as well, can reuse the extracted address relation.

Organizations can spread their domain by publishing the ontology relations for the public. The published relations can be used as a data source for other system such as websites and search engine etc. which will make the information more useful and valuable. The relations can be used for analyzing the activities of organizations that will help to improve their knowledge base.

In order to develop ontology relation from natural text, some challenges had to be faced and eliminated. Converting and chunking the NLP was one of the most challenging part of the research work as this part would affect the whole research. Open NLP by apache has been used for this purpose. It is widely used and used as tools in many research work.

Every annual report has its own page title; a lot of titles contain the word Maori. It was another challenge to skip these title from developing relations because when the reports converted to plain text then the title also converted as plain text which caused the output of meaningless ontology. The titles were ignored by editing plain text manually.

There are a lot of complex and compound sentences in the annual reports which resulted in complex subjects and objects. The complex subject or object had to be broken down into multiple ontologies manually. In some cases, the organization’s names were in short forms e.g. Health Research Council written as HRC. An internal dataset was created for the software in order to understand the same meaning of different presentation of organization’s name.

Due to the limited scope we could not implement all the possible executions thus in our thesis we have faced some limitation which is discussed as follows.

The data source was limited to four sectors; Health, Education, Finance and, Language and Culture. They might be the main sectors of concern but there are also other concerning sectors which this thesis paper did not focus on e.g. Tourism, Environment etc. The reports were collected which are available online and read-able by the software, whereas some organizations still publish their annual reports in printed versions only. Some organizations produce low resolution scanned copy reports those are not compatible for standard OCR; these kind of reports have been ignored due to limited scope of this research but could be used as the data source of this research work.

Some organizations limit the hosting of their reports. They use third party hosting platforms, which is why in some cases the website of the organizations show that the report is available in the link of third party hosting but actually it is not available any more or is not for public use. It would be great if these reports could be collected and added to the existing data source.

A software was developed for converting pdf report to plain ontology relations. This was developed by using JAVA and MYSQL as a desktop application which limits the mobility of its usage. As result if this system needs to be reused to other systems or even by an individual then it needs to be installed in a specific computer and needs to re-create the database which is neither user friendly nor convenient. Due to limited scope it was not possible to develop a cloud based application. If the online system could be developed

then it could be used by human beings, software and other applications. By developing online applications relations could be more publicly available and easily shared which could also be shared through API among different systems.

In the development process there was filtering and modification process which were: stop word filtering, modified text with same meaning word. In both cases, a dictionary leads the specific process. In filtering, nouns and verbs were considered as main focus although including pronouns could give more relations. The research work was limited in using pronoun as the whole NLP process was dependent on third party developed tools called Open NLP that does not provide any connection between noun and pronoun. Modified dictionaries were developed manually which can be strong if more accurate words are added to it and it could be done by spending more time in reading the reports.

There is a dictionary developed for starting search relations called “Target Word” on basis of the count of nouns. If the dictionaries could have been updated by adding words to it on the basis of relations of current target words, then the proposed system could produce more accurate and quantitative relations.

The system developed relations that connects organizations with Maori affairs very strongly. There were other relations that indirectly connected organizations and Maori affairs. This research tried to overcome this limitation by considering internal department of organizations but could not go through more branches due to limited scope.

To conclude, a lot of relations exist between different organizations and Maori issues, and the relations can be interpreted in order to turn them into meaningful structures. This research tried to establish that natural human language can be translated in linked data although there were some limitations. This research shows that this topic can be further researched in various sectors of Maori relations but that would require a lot of time and resource.

8 Future Work

Due to limitations with in this research we could only work on relations between organizations and Maori issues, and other relations to their issues are still unknown. The aim of this thesis could be further improved with the following proposed task's as future development:

Extend domain and range size In this thesis organizations were used as the domain and sets of key words called target words dictionary as our range. We have focused only on four sections, Health, Education, Finance, Language and Culture. This range of sectors can be extended to other sectors that include tourism , migration , history etc and develop a larger set of target words dictionary that will enhance us to extract more relations to be implemented

Design a pattern of relations A large number of relations were developed with subject - predicate - object. However we could not set any rules or regulations of joining the subject and object with the predicate. In future if a set rules of communicating with the subject and object can be developed then it possible to develop a design pattern of Maori relations, The design pattern will provide a way to solve issues related to extraction of relations between Maori and Organizations. The pattern isolates the variability that may exist in the requirements, making the overall system easier to understand and maintain. The design pattern also communicates between stockholders which make a system more popular and easy to understand and implement.

Develop cloud environment All our development was completed on a non-cloud environment but a cloud system can be developed and the results can be published on the cloud to make the system more useful. This will enhance the usability of our outputs and be more available to the general public so that they could use it as their source of future research. The cloud system could be developed with the change of a few technologies that include Java-Spring, Web Hosting, API etc.

9 Appendix:

9.1 Table A1: List of organization:

Organizations List

Group	Organization Name	Organization Owned By	Organization Type
Health	Auckland District Health Board	Government	District Health Board
Health	Bay of Plenty District Health Board	Government	District Health Board
Health	Canterbury District Health Board	Government	District Health Board
Health	Capital & Coast District Health Board	Government	District Health Board
Health	Counties Manukau Health	Government	District Health Board
Health	Hawkes Bay District Health Board	Government	District Health Board
Health	Hutt Valley District Health Board	Government	District Health Board
Health	Lakes District Health Board	Government	District Health Board
Health	MidCentral District Health Board	Government	District Health Board
Health	Nelson Marlborough District Health Board	Government	District Health Board
Health	Northland District Health Board	Government	District Health Board
Health	South Canterbury District Health Board	Government	District Health Board
Health	Southern District Health Board	Government	District Health Board

Health	Tairāwhiti District Health Board	Government	District Health Board
Health	Taranaki District Health Board	Government	District Health Board
Health	Waikato District Health Board	Government	District Health Board
Health	Wairarapa District Health Board	Government	District Health Board
Health	Waitemata District Health Board	Government	District Health Board
Health	West Coast District Health Board	Government	District Health Board
Health	Whanganui District Health Board	Government	District Health Board
Health	Accident Compensation Corporation (ACC)	Government	Non Profitable Organization
Health	Health Quality & Safety Commission	Government	Commission
Health	Health Research Council	Government	Research Centre
Health	Ministry of Health	Government	Ministry
Education	Careers.govt.nz	Government	Career Guide
Education	Education Counts	Government	Education Sector
Education	Education New Zealand	Government	Education Sector
Education	Education Review Office	Government	Education Sector
Education	Māori Education Trust	Non-Government	Trust
Education	Ministry of Education	Government	Education Sector

Education	New Zealand Qualification Authority	Government	Education Sector
Education	New Zealand's research and education network	Government	Education Sector
Education	Tertiary Education Commission	Government	Commission
Education	Waiariki Bay of Plenty Polytechnic	Government	Polytechnic
Language & Culture	Auckland Council	Government	Council
Language & Culture	Maori Language Commission	Government	Commission
Language & Culture	Māori Television	Government	Television
Language & Culture	TeMangaiPaho	Government	Maori Organization
Language & Culture	TVNZ	Private	Television
Finance	Accident Compensation Corporation (ACC)	Government	Non Profitable Organization
Finance	Careers.govt.nz	Government	Career Guide
Finance	Auckland Council	Government	Council
Finance	Department of Conservation	Government	Government Organization
Finance	Inland Revenue Department	Government	Tax
Finance	Ministry of Business Innovation and Employment	Government	Ministry
Finance	Ministry of Primary Industry	Government	Ministry
Finance	Mo TePuniKokiri	Government	Maori Organization

9.2 Table A2 : List of annual report with URL :

Organization Name	Report Year	ReportUrl
Accident Compensation Corporation (ACC)	2008	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/prd_ctrb093669.pdf
Accident Compensation Corporation (ACC)	2009	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/prd_ctrb118047.pdf
Accident Compensation Corporation (ACC)	2010	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/wpc109816.pdf
Accident Compensation Corporation (ACC)	2011	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/wpc096354.pdf
Accident Compensation Corporation (ACC)	2012	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/wpc115248.pdf
Accident Compensation Corporation (ACC)	2013	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/annual_report_2013.pdf
Accident Compensation Corporation (ACC)	2014	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/annual_report_2014.pdf
Accident Compensation Corporation (ACC)	2015	http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_communications/documents/reports_results/2015annualreport.pdf
Auckalnd District Health Board	2013	http://www.adhb.govt.nz/documents/ADHB_Annual_Report%20_2013_Final_eVersion.pdf
Auckalnd District Health Board	2015	http://www.adhb.govt.nz/documents/ADHB_Annual%20Report%202014_15.pdf
Auckland Council	2011	http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/annual_report/Documents/annualreport20102011.pdf
Auckland Council	2012	http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/annual_report/Documents/annualreport20112012vol3.pdf
Auckland Council	2013	http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/annual_report/Documents/annualreport20122013volume3.pdf
Auckland Council	2014	http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/annual_report/Documents/annualreport20132014summary.pdf
Auckland Council	2015	http://www.aucklandcouncil.govt.nz/EN/planspoliciesprojects/reports/annual_report/Documents/annualreport2014summaryreport.pdf
Bay of Plenty District Health Board	2010	http://www.bopdhb.govt.nz/media/25944/BOPDHB-Annual-Report-2010.pdf
Bay of Plenty District Health Board	2011	http://www.bopdhb.govt.nz/media/16305/BOPDHB-Annual-Report-2011.pdf
Bay of Plenty District Health Board	2012	http://www.bopdhb.govt.nz/media/30514/BOPDHB%20Annual%20Report%202012.pdf
Bay of Plenty District Health Board	2013	http://www.bopdhb.govt.nz/media/56869/bopdhb-annual-report-2013-final.pdf
Bay of Plenty District Health Board	2014	http://www.bopdhb.govt.nz/media/57733/bopdhb-annual-report-2014-final.pdf
Bay of Plenty District Health Board	2015	http://www.bopdhb.govt.nz/media/58721/bopdhb-annual-report-2015.pdf
Canterbury District Health Board	2009	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/cdhb-08-09-annual-report-end-2009.pdf

Canterbury District Health Board	2010	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/cdhb-09-10-annual-report-end-2010.pdf
Canterbury District Health Board	2011	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/cdhb-annual-accounts-for-year-ended-30-June-2011-website.pdf
Canterbury District Health Board	2012	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/annual-report-year-ended-30-june-2012.pdf
Canterbury District Health Board	2013	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/CDHB-Annual-Report-year-ended-30-June-2013-web.pdf
Canterbury District Health Board	2014	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/CDHB%20Annual%20Accounts%20to%2030%20June%202014.pdf
Canterbury District Health Board	2015	http://www.cdhb.health.nz/About-CDHB/corporate-publications/Documents/CDHB-Annual-Report-year-ended-June-2015.pdf
Capital & Coast District Health Board	2008	http://www.ccdhb.org.nz/aboutus/Annual_reports/Annual_report2008.pdf
Capital & Coast District Health Board	2009	http://www.ccdhb.org.nz/aboutus/Annual_reports/annual-report-2009.pdf
Capital & Coast District Health Board	2010	http://www.ccdhb.org.nz/aboutus/Annual_reports/annual-report-2010.pdf
Capital & Coast District Health Board	2011	http://www.ccdhb.org.nz/aboutus/Annual_reports/Annual%20report%2010-2011.pdf
Capital & Coast District Health Board	2012	http://www.ccdhb.org.nz/aboutus/Annual_reports/Annual%20Report%202012%20for%20web.pdf
Capital & Coast District Health Board	2013	http://www.ccdhb.org.nz/aboutus/Annual_reports/CCDHB-Annual-report-2012-2013.pdf
Capital & Coast District Health Board	2014	http://www.ccdhb.org.nz/aboutus/Annual_reports/CCDHB%20AR2013-4%20-%20web.pdf
Capital & Coast District Health Board	2015	http://www.ccdhb.org.nz/aboutus/Annual_reports/CCDHB%20Annual%20Report%202014-2015.pdf
Careers_govt_nz	2011	http://www.careers.govt.nz/assets/pages/docs/annual-report-year-ended-30-june-2011.pdf
Careers_govt_nz	2012	http://www.careers.govt.nz/assets/pages/docs/annual-report-2011-2012.pdf
Careers_govt_nz	2013	http://www.careers.govt.nz/assets/pages/docs/annual-report-year-ended-30june2012-part1.pdf
Careers_govt_nz	2014	http://www.careers.govt.nz/assets/pages/docs/2037-Careers-Annual-Report-2014-low-res.pdf
Careers_govt_nz	2015	http://www.careers.govt.nz/assets/pages/docs/annual-report-for-year-ended-30-June-2015.pdf
Counties Manukau Health	2009	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2009-CMDHB-annual-report.pdf
Counties Manukau Health	2010	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2010-Annual-Report.pdf
Counties Manukau Health	2011	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2011-Annual-Report.pdf
Counties Manukau Health	2012	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2012-CMDHB-Annual-Report.pdf
Counties Manukau Health	2013	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2013-Annual-Report.pdf
Counties Manukau Health	2014	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2014-Annual-Report.pdf
Counties Manukau Health	2015	http://www.countiesmanukau.health.nz/assets/About-CMH/Reports-and-planning/Annual-reports-and-plans/2015.11.18-CMDHB-Final-Annual-Report.pdf

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Department of Conservation	2009	http://www.doc.govt.nz/Documents/about-doc/role/policies-and-plans/annual-report-for-the-year-ended-30-june-2009.pdf
Department of Conservation	2010	http://www.doc.govt.nz/Documents/about-doc/annual-report-2010/annual-report-for-the-year-ended-30-june-2010.pdf
Department of Conservation	2011	http://www.doc.govt.nz/Documents/about-doc/annual-report-2011/doc-annual-report-year-ended-30-june-2011.pdf
Department of Conservation	2012	http://www.doc.govt.nz/Documents/about-doc/annual-report-2012/doc-annual-report-year-ended-30-june-2012.pdf
Department of Conservation	2013	http://www.doc.govt.nz/Documents/about-doc/annual-report-2013/doc-annual-report-2013.PDF
Department of Conservation	2014	http://www.doc.govt.nz/Documents/about-doc/annual-report-2014/doc-annual-report-2014.pdf
Department of Conservation	2015	http://www.doc.govt.nz/Documents/about-doc/role/publications/doc-annual-report-2015.pdf
Education Counts	2008	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0019/33517/SLS_AR08_FullReport.pdf
Education Counts	2009	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0006/58497/SLS_AR09_Full_Report_Optimized.pdf
Education Counts	2010	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0003/83910/SLS_AR_Oct2010.pdf
Education Counts	2011	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0018/105552/Student-Loan-Scheme-Annual-Report-Oct-2011.pdf
Education Counts	2012	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0020/114635/Student-Loan-Scheme-Annual-Report-2012.pdf
Education Counts	2013	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0018/161064/Student-Loan-Scheme-Annual-Report-2014.pdf
Education Counts	2013	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0011/144569/Student-Loan-Scheme-Annual-Report-2013.pdf
Education Counts	2014	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0018/161064/Student-Loan-Scheme-Annual-Report-2014.pdf
Education Counts	2015	http://www.educationcounts.govt.nz/__data/assets/pdf_file/0003/170229/Student-Loan-Scheme-Annual-Report-2015.pdf
Education New Zealand	2012	http://www.enz.govt.nz/assets/Uploads/ENZ-Annual-Report-2012-LR-0.pdf
Education New Zealand	2013	http://www.enz.govt.nz/assets/Uploads/ENZ-Annual-Report-2012-2013.pdf
Education New Zealand	2014	http://www.enz.govt.nz/assets/Uploads/Annual-Report-2013-2014.pdf
Education New Zealand	2015	http://www.enz.govt.nz/assets/Uploads/ENZ-Annual-Report-2014-15.pdf
Education Review Office	2010	http://www.ero.govt.nz/assets/Uploads/ERO-AR2010-AGweb.pdf
Education Review Office	2011	http://www.ero.govt.nz/assets/Uploads/ERO-AR2011-WEB.pdf
Education Review Office	2012	http://www.ero.govt.nz/assets/Uploads/ERO-AR2012.pdf
Education Review Office	2013	http://www.ero.govt.nz/assets/Uploads/ERO-Annual-Report-2013-final.pdf
Education Review Office	2014	http://www.ero.govt.nz/assets/Uploads/ERO-Annual-Report-2014-final-1.pdf
Education Review Office	2015	http://www.ero.govt.nz/assets/Uploads/ERO-Annual-Report-Low-Res.pdf

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Health Research Council	2008	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202008.pdf
Health Research Council	2009	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202009.pdf
Health Research Council	2010	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202010.pdf
Health Research Council	2011	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202011%20Web%20version.pdf
Health Research Council	2012	http://www.hrc.govt.nz/sites/default/files/Final%20Annual%20Report%20website%20version.pdf
Health Research Council	2013	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202013%20website.pdf
Health Research Council	2014	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202014%20Website%20version.pdf
Health Research Council	2015	http://www.hrc.govt.nz/sites/default/files/Annual%20Report%202015%20-%20FINAL%20for%20print.pdf
Hutt Valley District Health Board	2008	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2008.pdf
Hutt Valley District Health Board	2009	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2009.pdf
Hutt Valley District Health Board	2010	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2010.pdf
Hutt Valley District Health Board	2011	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2011.pdf
Hutt Valley District Health Board	2012	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2012.pdf
Hutt Valley District Health Board	2013	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2013.pdf
Hutt Valley District Health Board	2014	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/hutt-valley-dhb-annual-report-2014.pdf
Hutt Valley District Health Board	2015	http://www.huttvalleydhb.org.nz/about-us/reports-and-publications/annual-report/2015-hutt-valley-dhb-annual-report.pdf
Inland Revenue Department	2008	http://www.ird.govt.nz/resources/5/4/5440dc004e1b699dacdefcaea3c5a5e9/ar-2008-annual-report-with-disclaimer.pdf
Inland Revenue Department	2009	http://www.ird.govt.nz/resources/1/7/17373f804fe75cd183d9e353c1fd2485/ar-2009-full-report.pdf
Inland Revenue Department	2010	http://www.ird.govt.nz/resources/3/d/3d2d9d8044320113aef5be4e9c145ab7/ar-2010.pdf
Inland Revenue Department	2011	http://www.ird.govt.nz/resources/1/8/187dfa8048ab122ea8b4bd6425fa4360/ar-2011.pdf
Inland Revenue Department	2012	http://www.ird.govt.nz/resources/1/4/14a3ef004d1a9cf8915793d981e6622f/annual-report-2012.pdf
Inland Revenue Department	2013	http://www.ird.govt.nz/resources/6/4/643702804171ef74bb01fb6fe0111a70/annual-report-2013.pdf
Inland Revenue Department	2014	http://www.ird.govt.nz/resources/3/8/382b8962-6441-4e0c-81bd-e2b9e2961bfa/annual-report-2014.pdf
Inland Revenue Department	2015	http://www.ird.govt.nz/resources/4/8/4814b787-f64d-4989-accb-228bc334122d/annual-report-2015.pdf
Maori Education Trust	2015	http://maorieducation.org.nz/images/board/MET%20Annual%20Report%202015.pdf
Maori Language Commission	2014	http://www.tetaurawhiri.govt.nz/assets/Corporate-publications/Annual-Report/TTWh-Annual-Report-2014-d8-21May.pdf

Maori Language Commission	2015	http://www.tetaurawhiri.govt.nz/assets/Corporate-publications/Annual-Report/Annual-Report-2014-15-Final-Designed-English.pdf
Māori Television	2008	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202008.pdf
Māori Television	2009	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202009.pdf
Māori Television	2010	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202010.pdf
Māori Television	2011	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202011.pdf
Māori Television	2012	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202012.pdf
Māori Television	2013	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202013.pdf
Māori Television	2014	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%202014.pdf
Māori Television	2015	http://www.maoritelevision.com/sites/default/files/attachments/M%C4%81ori%20Television%20Annual%20Report%20-%202015.pdf
Mid Central District Health Board	2009	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/AR2009Web.pdf
Mid Central District Health Board	2010	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/Annual%20Summary%202010%20Web.pdf
Mid Central District Health Board	2011	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/Annual%20Report%202011%20Entire%20Document%20Web.pdf
Mid Central District Health Board	2012	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/annualreport1112FINALNov2012.pdf
Mid Central District Health Board	2013	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/AnnualReport2012-13.pdf
Mid Central District Health Board	2014	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/Annual%20Report%202013-14.pdf
Mid Central District Health Board	2015	http://www.midcentraldhb.govt.nz/Publications/AllPublications/Documents/MDHB%2014-15%20Annual%20Report%20FINAL.pdf
Ministry of Business	2013	http://www.mbie.govt.nz/publications-research/publications/mbie-corporate/MBIE-ANNUAL-REPORT-2013.pdf
Ministry of Business	2014	http://www.mbie.govt.nz/publications-research/publications/mbie-corporate/annual-report-2014.pdf
Ministry of Business	2015	http://www.mbie.govt.nz/publications-research/publications/mbie-corporate/MBIE%20Annual%20Report%202014-15.pdf
Ministry of Health	2008	http://www.health.govt.nz/system/files/documents/publications/annual-report2008.pdf
Ministry of Health	2009	http://www.health.govt.nz/system/files/documents/publications/annual-report2009.pdf
Ministry of Health	2010	http://www.health.govt.nz/system/files/documents/publications/annual-report2010.pdf
Ministry of Health	2011	http://www.health.govt.nz/system/files/documents/publications/annual-report-2011_0.pdf
Ministry of Health	2012	http://www.health.govt.nz/system/files/documents/publications/annual-report-for-year-ended-30-june2012-v2.pdf
Ministry of Health	2013	http://www.health.govt.nz/system/files/documents/publications/annual-report-year-ended-june-2013-oct13-v2.pdf
Ministry of Health	2014	http://www.health.govt.nz/system/files/documents/publications/annual-report-for-the-year-ended-june-2014-v3.pdf
Ministry of Health	2015	http://www.health.govt.nz/system/files/documents/publications/annual-report-year-ended-30-june-2015-ministry-of-health-oct15.pdf

Ministry Of Primary Industry	2012	https://www.mpi.govt.nz/document-vault/871
Ministry Of Primary Industry	2013	https://www.mpi.govt.nz/document-vault/103
Ministry Of Primary Industry	2014	https://www.mpi.govt.nz/document-vault/9854
Ministry Of Primary Industry	2015	https://www.mpi.govt.nz/document-vault/14548
Ministry of Education	2009	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/EducationAnnualReport2009Full.pdf
Ministry of Education	2010	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/EducationAnnualReport2010Full.pdf
Ministry of Education	2011	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/MOEAnnualReport2011Full.pdf
Ministry of Education	2012	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/MOEAnnualReport2012FullWeb.pdf
Ministry of Education	2013	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/MOEAnnualReport2013FullWeb.pdf
Ministry of Education	2014	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/MOEAnnualReport2014-Web.pdf
Ministry of Education	2015	http://www.education.govt.nz/assets/Documents/Ministry/Publications/Annual-Reports/MOE-Annual-Report-2015.pdf
Mo TePuniKokiri	2015	https://www.tpk.govt.nz/documents/download/1185/TPK-Annual-Report-2015.pdf
Nelson Marlborough District Health Board	2013	https://www.nmdhb.govt.nz/assets/Uploads/AnnualReport20122013.pdf
Nelson Marlborough District Health Board	2014	https://www.nmdhb.govt.nz/assets/Uploads/Annual-Report-2013-2014.pdf
Nelson Marlborough District Health Board	2015	https://www.nmdhb.govt.nz/assets/Uploads/AnnualReport2014-2015.pdf
New Zealand Qualification Authority	2014	http://www.nzqa.govt.nz/assets/About-us/Publications/Strategic-publications/Annual-Report-2013-2014-website.pdf
New Zealand Qualification Authority	2015	http://www.nzqa.govt.nz/assets/About-us/Publications/Strategic-publications/Annual-Report-2014-15.pdf
New Zealand's research and education network	2012	https://reannz.co.nz/documents/13/2012_annual_report.pdf
New Zealand's research and education network	2013	https://reannz.co.nz/documents/12/04423_reannz_annual_report_2013_www_fa_iYQyC6R.pdf
New Zealand's research and education network	2014	https://reannz.co.nz/documents/11/reannz_2014_annual_report_atgs2TX.pdf
New Zealand's research and education network	2015	https://reannz.co.nz/documents/24/REANNZ2015AnnualReport.pdf
Northland District Health Board	2008	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/2008-NDHB-Annual-Report.pdf
Northland District Health Board	2009	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/2009-NDHB-Annual-Report.pdf
Northland District Health Board	2010	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/2010-NDHB-Annual-Report.pdf
Northland District Health Board	2011	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/2011-NDHB-Annual-Report.pdf
Northland District Health Board	2012	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/FINAL%20-%20NDHB%20Annual%20Report%202012%20Website.pdf

Northland District Health Board	2013	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/2013%20NDHB%20Annual%20Report%20FINAL%20-%20%20website.pdf
Northland District Health Board	2014	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/Ann_Rep_14_Proof_FINAL_LowRes.pdf
Northland District Health Board	2015	http://www.northlanddhb.org.nz/Portals/0/Communications/Publications/1205%20NDHB%20Annual%20Report%202015.pdf
South Canterbury District Health Board	2008	http://www.scdhb.health.nz/uploads/File/Key_documents/Annual%20Report%202007-08.pdf
South Canterbury District Health Board	2009	http://www.scdhb.health.nz/uploads/File/Key_documents/Annual%20Report%20FINAL%20web%20copy.pdf
South Canterbury District Health Board	2010	http://www.scdhb.health.nz/uploads/File/Key_documents/SCDHBAnnual%20Report%202010%20web%20copy.pdf
South Canterbury District Health Board	2011	http://www.scdhb.health.nz/uploads/File/Key_documents/SCDHB%20Annual%20Report%202011%20web.pdf
South Canterbury District Health Board	2012	http://www.scdhb.health.nz/uploads/File/Key_documents/SCDHB%20Annual%20Report%202012%20web%20copy.pdf
South Canterbury District Health Board	2013	http://www.scdhb.health.nz/uploads/File/Publications/Annual%20Reports/SCDHB%20Annual%20Report%202013%20FINALWEBVERSION.pdf
South Canterbury District Health Board	2014	http://www.scdhb.health.nz/uploads/File/Publications/Annual%20Reports/Annual%20Report%202014%20FINAL%20_WEBFILE.pdf
South Canterbury District Health Board	2015	http://www.scdhb.health.nz/uploads/Annual%20Report%202014-2015.pdf
Taranaki District Health Board	2008	http://www.tdhb.org.nz/misc/documents/ar_2008.pdf
Taranaki District Health Board	2009	http://www.tdhb.org.nz/misc/documents/ar_2009.pdf
Taranaki District Health Board	2010	http://www.tdhb.org.nz/misc/documents/ar_2010.pdf
Taranaki District Health Board	2011	http://www.tdhb.org.nz/misc/documents/ar_2011.pdf
Taranaki District Health Board	2012	http://www.tdhb.org.nz/misc/documents/ar_2012.pdf
Taranaki District Health Board	2013	http://www.tdhb.org.nz/misc/documents/ar_2013.pdf
Taranaki District Health Board	2014	http://www.tdhb.org.nz/misc/documents/ar_2014.pdf
Taranaki District Health Board	2015	http://www.tdhb.org.nz/misc/documents/ar_2015.pdf
TeMangaiPaho	2011	http://www.tmp.govt.nz/uploads/data_object/file/data/222/TMP_Annual_Report_2011.pdf
TeMangaiPaho	2012	http://www.tmp.govt.nz/uploads/data_object/file/data/225/TMP_Annual_Report_2012.pdf
TeMangaiPaho	2013	http://www.tmp.govt.nz/uploads/data_object/file/data/228/Annual_Report_2013.pdf
TeMangaiPaho	2014	http://www.tmp.govt.nz/uploads/data_object/file/data/231/2013-14_Web_Version.pdf
TeMangaiPaho	2015	http://www.tmp.govt.nz/uploads/data_object/file/data/1457/TMP_AR15_web.pdf
Tertiary Education Commission	2008	http://www.tec.govt.nz/Documents/Publications/PBRF-AR-2008-for-web.pdf
Tertiary Education Commission	2009	http://www.tec.govt.nz/Documents/Publications/pbrf-2009-annual-report.pdf
Tertiary Education Commission	2010	http://www.tec.govt.nz/Documents/Publications/PBRF-AR-2010.pdf

Tertiary Education Commission	2011	http://pbrfar2011.publications.tec.govt.nz/uploads/TEC-PBRF-Annual-Report-2011.pdf
Tertiary Education Commission	2012	http://www.tec.govt.nz/Documents/Publications/TEC-Annual-Report-for-the-12-months-ending-30June2012.pdf
Tertiary Education Commission	2013	http://www.tec.govt.nz/Documents/Publications/TEC-Annual-Report-2013.pdf
Tertiary Education Commission	2014	http://www.tec.govt.nz/Documents/Publications/TEC-Annual-Report-30%20June-2014.pdf
Tertiary Education Commission	2015	http://www.tec.govt.nz/Documents/Publications/TEC-Annual-Report-2014-2015.pdf
TVNZ	2008	http://images.tvnz.co.nz/tvnz_images/tvnz/About%20TVNZ/TVNZ_AR_FY2008_web.pdf
TVNZ	2010	http://images.tvnz.co.nz/tvnz_images/tvnz/About%20TVNZ/TVNZ_AR_FY10.pdf
TVNZ	2011	http://images.tvnz.co.nz/tvnz_images/tvnz/About%20TVNZ/TVNZAR_FY2011_Web.pdf
TVNZ	2012	http://images.tvnz.co.nz/tvnz_images/tvnz/About%20TVNZ/tvnz-annual-report-fy-2012.pdf
TVNZ	2013	http://images.tvnz.co.nz/tvnz_images/about_tvnz/TVNZAR_FY2013_Updated.pdf
TVNZ	2014	https://www.parliament.nz/resource/mi-nz/51DBHOH_PAP60623_1/d302d7975f460c003d2f642e9806e555e4614718
TVNZ	2015	https://www.parliament.nz/resource/en-nz/51DBHOH_PAP66276_1/2709a35caac09b75442a36f8fcfb4195d6ba05fa
Wairarapa District Health Board	2008	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2008.pdf
Wairarapa District Health Board	2009	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2009.pdf
Wairarapa District Health Board	2010	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2010.pdf
Wairarapa District Health Board	2011	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2011.pdf
Wairarapa District Health Board	2012	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2012.pdf
Wairarapa District Health Board	2013	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2013.pdf
Wairarapa District Health Board	2014	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/wairarapa-dhb-annual-report-2014.pdf
Wairarapa District Health Board	2015	http://www.wairarapa.dhb.org.nz/about-us/reports-and-publications/annual-report/2015-wairarapa-dhb-annual-report.pdf
Waitemata District Health Board	2010	http://www.waitematadhb.govt.nz/assets/Documents/annual-Reports/annual-report-2010.pdf
Waitemata District Health Board	2011	http://www.waitematadhb.govt.nz/assets/Documents/annual-Reports/Annual-Report-2011-3.pdf
Waitemata District Health Board	2012	http://www.waitematadhb.govt.nz/assets/Documents/annual-Reports/Annual-Report-2011-2012.pdf
Waitemata District Health Board	2013	http://www.waitematadhb.govt.nz/assets/Documents/annual-Reports/Annual-Report-2012-2013-lr.pdf
Waitemata District Health Board	2014	http://www.waitematadhb.govt.nz/assets/Documents/annual-Reports/Annual-Report-2013-2014.pdf
Waitemata District Health Board	2015	http://www.waitematadhb.govt.nz/assets/Documents/annual-Reports/Annual-Report-2014-2015.pdf
West Coast District Health Board	2008	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2008.pdf

West Coast District Health Board	2009	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2009.pdf
West Coast District Health Board	2010	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2010.pdf
West Coast District Health Board	2011	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2011.pdf
West Coast District Health Board	2012	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2012.pdf
West Coast District Health Board	2013	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2013.pdf
West Coast District Health Board	2014	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2014.pdf
West Coast District Health Board	2015	http://www.westcoastdhb.org.nz/publications/documents/annual_reports/ann_report_2015.pdf

9.3 Table A3 : Spread sheet for health sector :

Ontology Relation & Class Structure of Health Sector

Total Ontology: 175

Health Research Council

Total ontologies for Health Research Council: 31

Subject	Subject Class	Predicate	Object	Object Class
Health Research Council	Organization	has location	Health Research Location	Address
Health Research Council	Organization	has internal department	Maori Health PhD Scholarship	Internal Department
Health Research Council	Organization	has internal department	Department of Waikato	Internal Department
Health Research Council	Organization	has internal department	Grant Approval Committee	Internal Department
Health Research Council	Organization	has internal department	Investment health services	Internal Department
Health Research Council	Organization	Contributing	Maori Health Improvement	Activity For
Health Research Council	Organization	Provides	Guidelines On The Conduct Of Maori Health	Activity For
Health Research Council	Organization	Developing	Pacific Health	Activity For
Health Research Council	Organization	Prevent	Obesity in Maori	Activity For
Health Research Council	Organization	have experienced	Maoris illness	Activity For
Health Research Council	Organization	have experienced	violence trauma	Activity For
Health Research Council	Organization	introduced	career development opportunities for Pacific peoples	Activity For
Health Research Council	Organization	Provides	Workforce Awards For Pacific People	Activity For
Health Research Council	Organization	Provides	Direction For Maori Research Investment	Activity For
Health Research Council	Organization	Exposure	Health & Safety Risks	Activity For

Health Research Council	Organization	Spanning	Maori & Pacific Health Research Spectrum	Activity For
Health Research Council	Organization	supports	research of Pacific people with older adults and children youth	Activity For
Health Research Council	Organization	has contribution	management of the Maori Pacific Public Health	Activity For
Health Research Council	Organization	reduce	illness in Maori infants	Activity For
Health Research Council	Organization	Targeting	tumour stroma with DMXAA for the treatment of melanoma	Activity For
Health Research Council	Organization	Targeting	genes in the treatment of tuberculosis	Activity For
Health Research Council	Organization	transmitted	infections among Maori in the Bay of Plenty	Activity For
Health Research Council	Organization	Understanding	determinants of inequalities in breast cancer survival	Activity For
Health Research Council	Organization	Improving	health interventions support for mothers	Activity For
Health Research Council	Organization	refocused	interventions for Maori deaf/hearing	Activity For
Health Research Council	Organization	operates	scholarship fund for Maori employees	Activity For
Maori Health PhD Scholarship	Internal Department	Improve	Symptoms Of Diabetic Neuropathy	Activity For
Department of Waikato	Internal Department	Enhance	Food Security and Activity For For Pacific People	Activity For
Investment health services	Internal Department	Research	For Maori and Pacific health	Activity For
Maori Health PhD Scholarship	Internal Department	Enhancing	capacity of participation in violence	Activity For
Maori	People	are affected	by chemical related illness	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Health Research Council	Types	Maori , Health , Government	
	Health Research Council	Superclass	Null	
	Health Research Council	Name	Health Research Council	
Internal Department: Superclass, Types, Name				

	Maori Health PhD Scholarship	Superclass	Health Research Council	
		Type	Scholarship , Maori, Study, Health	
		Name	Maori Health PhD Scholarship	
	Department of Waikato	Superclass	Health Research Council	
		Type	Maori, Health	
		Name	Department of Waikato	
	Grant Approval Committee	Superclass	Health Research Council	
		Type	Health , Scholarship	
		Name	Grant Approval Committee	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Health Research Location	Street Address	Level 3, 110 Stanley St	
		Suburb	Grafton	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1010	
People : Types, Name				
	Maori	Name	Maori	
		Type	Maori	
	Pacific	Name	Pacific	
		Type	Pacific	
	Kiwi	Kiwi	Kiwi	
		Type	Non Moiri	

Northland District Health Board

Total ontologies for Northland District Health Board: 22

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Northland District Health Board	Organization	has address	Northland District Health Board Location	Address
Northland District Health Board	Organization	has internal department	Northland Health Services Plan	Internal Department
Northland District Health Board	Organization	has internal department	Maori health Family Planning	Internal Department
Northland District Health Board	Organization	has internal department	Schools of Nursing	Internal Department
Northland District Health Board	Organization	contributed	NHSP goals with the focus on improving Māori health	Activity For
Northland District Health Board	Organization	focus	on improving maori health	Activity For
Northland District Health Board	Organization	assist	maori women	Activity For
Northland District Health Board	Organization	support	maori patients	Activity For
Northland District Health Board	Organization	holds	hub contract for maori Health	Activity For
Northland District Health Board	Organization	has	Career Programme for maori	Activity For
Northland District Health Board	Organization	has focused	youth maori women	Activity For
Northland District Health Board	Organization	provide	range of services with packages of day peer family-whānau Kaupapa maori	Activity For

			services Alcohol and Drug treatment programmes	
Northland District Health Board	Organization	characterised	Maori communities	Activity For
Northland District Health Board	Organization	has	Health action for Maori health outcomes	Activity For
Northland District Health Board	Organization	have been estimated	Maori totals	Activity For
Northland District Health Board	Organization	provided	community health	Activity For
Northland District Health Board	Organization	operates	scholarship fund for Maori employees	Activity For
Northland District Health Board	Organization	provide	incentive to youth maori women	Activity For
Northland District Health Board	Organization	Eliminating	gap between maori and non-maori	Activity For
Northland Health Services Plan	Internal Department	Set	Headline Target that over five years the life expectancy gap between maori	Activity For
Maori health Family Planning	Internal Department	shared	results from the health needs assessment	Activity For
Schools of Nursing	Internal Department	support	maori students	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Northland District Health Board	Types	Maori , Health , Government , District Health Board	
		Superclass	Nil	
		Name	Northland District Health Board	
Internal Department: Supperclass, Types, Name				
	Northland Health Services Plan	Superclass	Northland District Health Board	
		Type	Service , Health	
		Name	Northland Health Services Plan	
	Maori health Family Planning	Superclass	Northland District Health Board	
		Type	Maori, Health, Family	
		Name	Maori health Family Planning	

	Schools of Nursing	Superclass	Northland District Health Board	
		Type	Health , Scholarship, Study	
		Name	Schools of Nursing	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Northland District Health Board Location	Street Address	Tohorā House, Whangarei Hospital Campus, Maunu Road,	
		Suburb	Whangarei	
		City	Whangarei	
		Region	North Island	
		Country	New Zealand	
		Postal Code	0148	

Waitemata District Health Board

Total ontologies for Waitemata District Health Board: 10

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Waitemata District Health Board	Organization	has address	Waitemata District Health Board Location	Address
Waitemata District Health Board	Organization	has internal department	PHO Smoke Free Teams	Internal Department
Waitemata District Health Board	Organization	has internal department	Education Curriculum	Internal Department
Waitemata District Health Board	Organization	Support	Pacific pregnancy	Activity For
Waitemata District Health Board	Organization	arrange	Smoking cessation programmes	Activity For
Waitemata District Health Board	Organization	has	smoke coaches	Activity For
Waitemata District Health Board	Organization	ran	Pacific leaders coach development programme	Activity For
PHO Smoke Free Teams	Internal Department	have initiated	number of activities	Activity For

Education Curriculum	Internal Department	assist	Pacific families care	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Waitemata District Health Board	Types	Maori , Health , Government , District Health Board	
		Superclass	Null	
		Name	Waitemata District Health Board Location	
Internal Department: Superclass, Types, Name				
	PHO Smoke Free Teams	Superclass	Waitemata District Health Board Location	
		Type	Service , Health , Smoke	
		Name	PHO Smoke Free Teams	
	Education Curriculum	Superclass	Northland District Health Board	
		Type	Education	
		Name	Education Curriculum	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Waitemata District Health Board Location	Street Address	Level 2 ,15 Shea Terrace	
		Suburb	Takapuna	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	0622	

Capital & Coast District Health Board

Total ontologies for Capital & Coast District Health Board: 12

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Capital & Coast District Health Board	Organization	has address	Capital & Coast District Health Board Location	Address
Capital & Coast District Health Board	Organization	has	promotion events	Activity For
Capital & Coast District Health Board	Organization	focused	maori and Pacific services	Activity For
Capital & Coast District Health Board	Organization	improve	health outcomes for Pacific people	Activity For
Capital & Coast District Health Board	Organization	has begun	maori and Pacific Workforce Development Project	Activity For
Capital & Coast District Health Board	Organization	supporting	training for a maori a Pacific lactation consultant	Activity For
Capital & Coast District Health Board	Organization	carried	Pacific Stocktake	Activity For
Capital & Coast District Health Board	Organization	has focussed	Pacific Provider	Activity For
Capital & Coast District Health Board	Organization	measures	A reduction in mortality rates for maori & Pacific mortality	Activity For
Capital & Coast District Health Board	Organization	briefed	maori health initiatives	Activity For
Capital & Coast District Health Board	Organization	develop	maori Health	Activity For
Capital & Coast District Health Board	Organization	continue s to perform	maori ethnicities	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Capital & Coast District Health Board	Types	Maori , Health , Government , District Health Board	
		Superclasses	Nil	
		Name	Capital & Coast District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		

	Capital & Coast District Health Board Location	Street Address	Wellington Hospital , Riddiford Street	
		Suburb	Newtown	
		City	Auckland	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6021	

Bay of Plenty District Health Board

Total ontologies for Bay of Plenty District Health Board: 8

Subject	Subject Class / URL	Predic ate	Object	Object Class / URL
Bay of Plenty District Health Board	Organization	has addres s	Bayof Plenty District Health Board Location	Address
Bay of Plenty District Health Board	Organization	funded	Child Tamariki Ora programmes	Activity For
Bay of Plenty District Health Board	Organization	provid e	services to maori	Activity For
Bay of Plenty District Health Board	Organization	includ e	maori representative	Activity For
Bay of Plenty District Health Board	Organization	has taken	system approach	Activity For
Bay of Plenty District Health Board	Organization	provid e	maori Health Plan	Activity For
Bay of Plenty District Health Board	Organization	provid e	needs of maori	Activity For
Bay of Plenty District Health Board	Organization	Under stand	maori Health	Activity For
Class	Instance	Proper ties	Value	
Organization : Types , Name				
	Bay of Plenty District Health Board	Types	Maori , Health , Government , District Health Board	
		Superc lass	Null	
		Name	Bay of Plenty District Health Board	

Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Capital & Coast District Health Board Location	Street Address	829 Cameron Rd	
		Suburb	Tauranga South	
		City	Tauranga	
		Region	Bay of Plenty	
		Country	New Zealand	
		Postal Code	3112	

West Coast District Health Board

Total ontologies for West Coast District Health Board: 16

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
West Coast District Health Board	Organization	has address	West Coast District Health Board Location	Address
West Coast District Health Board	Organization	provides	needs of maori	Activity For
West Coast District Health Board	Organization	spend	maori health and targeted services	Activity For
West Coast District Health Board	Organization	deliver	health and disability services for maori	Activity For
West Coast District Health Board	Organization	focus	increasing awareness of maori culture	Activity For
West Coast District Health Board	Organization	has focused	priority for maori	Activity For
West Coast District Health Board	Organization	assist	provision of maori positions	Activity For
West Coast District Health Board	Organization	plan	priority areas	Activity For
West Coast District Health Board	Organization	set	targets for maori workforce	Activity For
West Coast District Health Board	Organization	fund	maori health improvement	Activity For

West Coast District Health Board	Organization	commi tted	investment in maori Health	Activity For
West Coast District Health Board	Organization	has	training programmes	Activity For
West Coast District Health Board	Organization	initiati ves	maori health provider staff	Activity For
West Coast District Health Board	Organization	workin g	maori patients	Activity For
West Coast District Health Board	Organization	set	health outcomes for maori	Activity For
West Coast District Health Board	Organization	improv ed	nutrition	Activity For
Class	Instance	Proper ties	Value	
Organization : Types , Name				
	West Coast District Health Board	Types	Non Maori , Health , Government , District Health Board	
		Superc lass	Nill	
		Name	West Coast District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	West Coast District Health Board Location	Street Addres s	146 High St	
		Subur b	Greymouth	
		City	Greymouth	
		Region	South Island	
		Countr y	New Zealand	
		Postal Code	7805	

Canterbury District Health Board

Total ontologies for Canterbury District Health Board: 10

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Canterbury District Health Board	Organization	has address	Canterbury District Health Board Location	Address
Canterbury District Health Board	Organization	work	maori and Pacific communities	Activity For
Canterbury District Health Board	Organization	support	smoke parks playgrounds throughout Canterbury	Activity For
Canterbury District Health Board	Organization	met	target across all ethnicity groups	Activity For
Canterbury District Health Board	Organization	supports	smoking cessation	Activity For
Canterbury District Health Board	Organization	has relationships	with maori groups	Activity For
Canterbury District Health Board	Organization	establishing relationships	with maori representative group	Activity For
Canterbury District Health Board	Organization	support	maori mothers	Activity For
Canterbury District Health Board	Organization	initiative	maori Pasifika trades training	Activity For
Canterbury District Health Board	Organization	support	breastfeeding	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	West Coast District Health Board	Types	Non Maori , Health , Government , District Health Board	
		Superclass	Nil	
		Name	West Coast District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Canterbury District Health Board Location	Street Address	32 Oxford Terrace	
		Suburb	Christchurch Centra	

		City	Christchurch	
		Region	Christchurch	
		Country	New Zealand	
		Postal Code	8011	

South Canterbury District Health Board

Total ontologies for South Canterbury District Health Board: 4

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
South Canterbury District Health Board	Organization	has address	South Canterbury District Health Board Location	Address
South Canterbury District Health Board	Organization	established	Maori Health Plan	Activity For
South Canterbury District Health Board	Organization	Make	Board on issues of maori health	Activity For
South Canterbury District Health Board	Organization	provide	maori health support	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	South Canterbury District Health Board	Types	Non Maori , Health , Government , District Health Board	
	South Canterbury District Health Board	Superclass	Null	
	South Canterbury District Health Board	Name	South Canterbury District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code				

	South Canterbury District Health Board Location	Street Address	High St, Parkside	
		Suburb	Timaru	
		City	Timaru	
		Region	South Island	
		Country	New Zealand	
		Postal Code	7910	

Taranaki District Health Board

Total ontologies for Taranaki District Health Board: 12

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Taranaki District Health Board	Organization	has address	Taranaki District Health Board Location	Address
Taranaki District Health Board	Organization	did not quite reach	target for maori	Activity For
Taranaki District Health Board	Organization	funded	Maori health inequalities	Activity For
Taranaki District Health Board	Organization	funded	maori	Activity For
Taranaki District Health Board	Organization	promote	community actions	Activity For
Taranaki District Health Board	Organization	support	community actions	Activity For
Taranaki District Health Board	Organization	reducing	Maori health inequalities	Activity For
Taranaki District Health Board	Organization	set goal	improving maori health	Activity For
Taranaki District Health Board	Organization	has	maori healh foundation	Activity For
Taranaki District Health Board	Organization	provide	Maori health services	Activity For

Taranaki District Health Board	Organization	focused	Maori health priorities	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Taranaki District Health Board	Types	Non Maori , Health , Government , District Health Board	
	Taranaki District Health Board	Superclass	Nil	
	Taranaki District Health Board	Name	Taranaki District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Taranaki District Health Board Location	Street Address	David St	
		Suburb	Lynmouth	
		City	New Plymouth	
		Region	North Island	
		Country	New Zealand	
		Postal Code	4310	

Mid Central District Health Board

Total ontologies of Mid Central District Health Board: 4

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Mid Central District Health Board	Organization	has address	Mid Central District Health Board Location	Address
Mid Central District Health Board	Organization	arrange	screening programme	Activity For
Mid Central District Health Board	Organization	Increased spend	Maori health and disability care protocols	Activity For
Mid Central District Health Board	Organization	achieved	groups except maori children	Activity For
Class	Instance	Properties	Value	

Organization : Types , Name				
	Mid Central District Health Board	Types	Non Maori , Health , Government , District Health Board	
	Mid Central District Health Board	Superclass	Nil	
	Mid Central District Health Board	Name	Mid Central District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Counties Manukau Health Location	Street Address	50 Ruahine St	
		Suburb	Roslyn	
		City	Palmerston North	
		Region	North Island	
		Country	New Zealand	
		Postal Code	4442	

Counties Manukau Health

Total ontologies of Counties Manukau Health: 7

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Counties Manukau Health	Organization	has addresses	Counties Manukau Health Location	Address
Counties Manukau Health	Organization	target	Maori and Pacific students	Activity For
Counties Manukau Health	Organization	Checked	risk management results for Maori	Activity For
Counties Manukau Health	Organization	provide	quality health care for maori	Activity For
Counties Manukau Health	Organization	trained	Pacific nurses	Activity For

Counties Manukau Health	Organization	works	Pacific churches	Activity For
Counties Manukau Health	Organization	established	Bachelor of Pacific	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Counties Manukau Health	Types	Non Maori , Health , Government , District Health Board	
	Counties Manukau Health	Superclass	Nil	
	Counties Manukau Health	Name	Counties Manukau Health	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Counties Manukau Health Location	Street Addresses	72 Kitchener Road	
		Suburb	Waiuku	
		City	Pukekohe	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	2120	

Wairarapa District Health Board

Total ontologies of Wairarapa District Health Board: 9

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Wairarapa District Health Board	Organization	has address	Wairarapa District Health Board Location	Address
Wairarapa District Health Board	Organization	has internal department	health and exercise programme	Internal Department
Wairarapa District Health Board	Organization	measures	progress of maori & Pacific mortality	Activity For

Wairarapa District Health Board	Organization	achieved	target for maori and Pacific breast screening rates	Activity For
Wairarapa District Health Board	Organization	support	maori adolescents	Activity For
Wairarapa District Health Board	Organization	suggests	enrolment figures for Maori	Activity For
Wairarapa District Health Board	Organization	support	Maori nursing	Activity For
Wairarapa District Health Board	Organization	improve	Maori health	Activity For
health and exercise programme	Internal Department	targeted	Pacific	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Wairarapa District Health Board	Types	Non Maori , Health , Government , District Health Board	
		Superclass	Nil	
		Name	Wairarapa District Health Board	
Internal Department : Types , Name				
	health and exercise programme	Types	Non Maori , Health , Government , District Health Board	
		Superclass	Wairarapa District Health Board	
		Name	health and exercise programme	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Wairarapa District Health Board Location	Street Address	96 Blair St	
		Suburb	Lansdowne	
		City	Masterton	
		Region	North Island	
		Country	New Zealand	

		Postal Code	5840	

Auckland District Health Board

Total ontologies of Auckland District Health Board: 5

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Auckland District Health Board	Organization	has address	Auckland District Health Board Location	Address
Auckland District Health Board	Organization	support	maori and Pacific people	Activity For
Auckland District Health Board	Organization	has	trust scholarship	Activity For
Auckland District Health Board	Organization	provide	scholarship to maori student	Activity For
Auckland District Health Board	Organization	achieve	maori health gain	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Auckland District Health Board	Types	Non Maori , Health , Government , District Health Board	
	Auckland District Health Board	Superclass	Nil	
	Auckland District Health Board	Name	Auckland District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Auckland District Health Board Location	Street Address	2 Park Rd	
		Suburb	Grafton	

		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1023	

Nelson Marlborough District Health Board

Total ontologies of Nelson Marlborough District Health Board: 7

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Nelson Marlborough District Health Board	Organization	has address	Nelson Marlborough District Health Board Location	Address
Nelson Marlborough District Health Board	Organization	has Internal Department	Iwi Health Board	Internal Department
Nelson Marlborough District Health Board	Organization	concerned	lack of ethnicity data collection	Activity For
Nelson Marlborough District Health Board	Organization	focus	Maori health planning	Activity For
Nelson Marlborough District Health Board	Organization	strengthen	Maori leadership	Activity For
Nelson Marlborough District Health Board	Organization	supporting	Maori patients	Activity For
Iwi Health Board	Internal Department	improving	Maori health	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Nelson Marlborough District Health Board	Types	Non Maori , Health , Government , District Health Board	
		Superclass	Null	
		Name	Nelson Marlborough District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		

	Nelson Marlborough District Health Board Location	Street Address	Braemar Campus, Waimea Rd	
		Suburb	Nelson South	
		City	Nelson	
		Region	Nelson	
		Country	New Zealand	
		Postal Code	7010	

Hutt Valley District Health Board

Total ontologies of Hutt Valley District Health Board: 8

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Hutt Valley District Health Board	Organization	has address	Hutt Valley District Health Board Location	Address
Hutt Valley District Health Board	Organization	has Internal Department	Maori Partnership Board	Internal Department
Hutt Valley District Health Board	Organization	has Internal Department	Diabetes Management	Internal Department
Hutt Valley District Health Board	Organization	Funding	Maori Health Advisor	Activity For
Hutt Valley District Health Board	Organization	has	maori health teams	Activity For
Hutt Valley District Health Board	Organization	measures progress	A reduction in mortality rates for maori & Pacific	Activity For
Diabetes Management	Internal Department	target	Maori and Pacific populations	Activity For
Maori Partnership Board	Internal Department	maintain	governance relationship	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Hutt Valley District Health Board	Types	Non Maori , Health , Government , District Health Board	
		Superclass	Nil	

		Name	Hutt Valley District Health Board	
Address : Street Address, Suburb , City, Region, Country , Postal Code		Name		
	Hutt Valley District Health Board Location	Street Address	42 Queens Dr	
		Suburb	Lower Hutt	
		City	Lower Hutt	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	5010	

Health Quality & Safety Commission

Total ontologies of Health Quality & Safety Commission: 2

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Health Quality & Safety Commission	Organization	has location	Health Quality & Safety Commission location	Address
Health Quality & Safety Commission	Organization	provide	maternity care to maori mother	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Health Quality & Safety Commission	Types	Non Maori , Health , Government	
	Health Quality & Safety Commission	Superclass	Nil	
	Health Quality & Safety Commission	Name	Health Quality & Safety Commission	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Health Quality & Safety Commission location	Street Addresses	Level 9, Customs House 17–21 Whitmore Street	

		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6146	

Ministry of Health

Total ontologies of Ministry of Health: 6

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Ministry of Health	Organization	has location	Ministry of Health Location	Address
Ministry of Health	Organization	has Internal Department	Pacific health workers group	Internal Department
Ministry of Health	Organization	Support	Pacific health sector	Activity For
Ministry of Health	Organization	Support	Development of the Pacific health	Activity For
Ministry of Health	Organization	Reporting	Community Oral Health Service	Activity For
Ministry of Health	Organization	Investment Approach	Pacific provider	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Ministry of Health	Types	Non Maori , Health , Government	
		Superclass	Nil	
		Name	Ministry of Health	
Internal Department: Superclass, Types, Name				
	Pacific health workers group	Superclass	Ministry of Health	
		Type	Maori, Health	
		Name	Pacific health workers Group	

Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Ministry of Health Location	Street Address	133 Molesworth Street	
		Suburb	Thorndon	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6011	

9.4 Table A4 : Spread sheet for Education sector :

Ontology Relation & Class Structure of Education Sector

Total Ontology: 75

Ministry of Education

Total ontologies of Ministry of Education: 30

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Ministry of Education	Organization	has location	Ministry of Education location	Address
Ministry of Education	Organization	has Internal Department	NCEA	Internal Department
Ministry of Education	Organization	has Internal Department	Pasifika Power UP Programme	Internal Department
Ministry of Education	Organization	has Internal Department	Tertiary Education Commission	Internal Department
Ministry of Education	Organization	has Internal Department	The Pasifika Education Plan	Internal Department
Ministry of Education	Organization	has Internal Department	Pasifika Organisational Partnership Strategy	Internal Department
Ministry of Education	Organization	has Internal Department	childhood education plan	Internal Department
Ministry of Education	Organization	has Internal Department	tertiary education system	Internal Department
Ministry of Education	Organization	support	Maori and Pasifika children	Activity For
Ministry of Education	Organization	support	maori student	Activity For
Ministry of Education	Organization	employed	pasifika specialists	Activity For
Ministry of Education	Organization	identifies	maori student	Activity For

Ministry of Education	Organization	include	maori language in education	Activity For
Ministry of Education	Organization	employ	Pasifika childhood education teachers	Activity For
Ministry of Education	Organization	develop	approach to learning	Activity For
Ministry of Education	Organization	implement	approach to learning	Activity For
Ministry of Education	Organization	focused	maori and Pasifika children	Activity For
Ministry of Education	Organization	priority	Maori learners	Activity For
Ministry of Education	Organization	providing	Pasifika responsiveness	Activity For
Ministry of Education	Organization	support	Pasifika and community groups	Activity For
Ministry of Education	Organization	produced	Maori language resources	Activity For
NCEA	Internal Department	increased	maori student	Activity For
NCEA	Internal Department	include	maori student	Activity For
Pasifika Power UP Programme	Internal Department	helps	students	Activity For
Tertiary Education Commission	Internal Department	develop	maori and Pasifika Trades Training	Activity For
The Pasifika Education Plan	Internal Department	provides	education vision and investment approach	Activity For
The Pasifika Education Plan	Internal Department	focuses	improving results for Pasifika learners	Activity For
Pasifika Organisational Partnership Strategy	Internal Department	guided	Pasifika community groups	Activity For
childhood education plan	Internal Department	directed	maori and Pasifika	Activity For
tertiary education system	Internal Department	improves	achievement of maori and Pasifika learners	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Ministry of Education	Types	Non Maori , Health , Government	
	Ministry of Education	Superclass	Null	

	Ministry of Education	Name	Ministry of Education	
Internal Department: Superclass, Types, Name				
	NCEA	Superclass	Ministry of Education	
	NCEA	Type	Maori, Education	
	NCEA	Name	NCEA	
	Pasifika Power UP Programme	Superclass	Ministry of Education	
	Pasifika Power UP Programme	Type	Maori, Education	
	Pasifika Power UP Programme	Name	Pasifika Power UP Programme	
	Tertiary Education Commission	Superclass	Ministry of Education	
	Tertiary Education Commission	Type	Maori, Education	
	Tertiary Education Commission	Name	Tertiary Education Commission	
	The Pasifika Education Plan	Superclass	Ministry of Education	
	The Pasifika Education Plan	Type	Maori, Education	
	The Pasifika Education Plan	Name	The Pasifika Education Plan	
	Pasifika Organisational Partnership Strategy	Superclass	Ministry of Education	
	Pasifika Organisational Partnership Strategy	Type	Maori, Education	
	Pasifika Organisational Partnership Strategy	Name	Pasifika Organisational Partnership Strategy	
	childhood education plan	Superclass	Ministry of Education	
	childhood education plan	Type	Maori, Education	

	childhood education plan	Name	childhood education plan	
	tertiary education system	Superclass	Ministry of Education	
	tertiary education system	Type	Maori, Education	
	tertiary education system	Name	tertiary education system	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Ministry of Education location	Street Address	12-18 Normanby Rd	
		Suburb	Mount Eden	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1011	

Education Review Office

Total ontologies of Education Review Office: 6

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Education Review Office	Organization	has location	Education Review Office location	Address
Education Review Office	Organization	has Internal department	Pasifika Education Plan	Internal Department
Education Review Office	Organization	found	lack of responsiveness to Ma-ori and Pacific children	Activity For
Education Review Office	Organization	promotes	Pacific forums	Activity For
Education Review Office	Organization	indicators	to ensure Pacific People	Activity For
Education Review Office	Organization	provide	language for the interaction	Activity For

Class	Instance	Properties	Value	
Organization : Types , Name				
	Education Review Office	Types	Non Maori , Education , Government	
	Education Review Office	Superclass	Null	
	Education Review Office	Name	Education Review Office	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Education Review Office location	Street Address	Tari Matua Level 1, 101 Lambton Quay	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6011	

Tertiary Education Commission

Total ontologies of Tertiary Education Commission: 8

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Tertiary Education Commission	Organization	has location	Tertiary Education Commission location	Address
Tertiary Education Commission	Organization	enrol	maori and Pacific	Activity For
Tertiary Education Commission	Organization	support	maori and Pacific	Activity For
Tertiary Education Commission	Organization	support	Pasifika learners	Activity For
Tertiary Education Commission	Organization	regarding	ethnicity	Activity For

Tertiary Education Commission	Organization	has Budget	maori and Pacific	Activity For
Tertiary Education Commission	Organization	improves	course and qualification rates for Pasifika	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Tertiary Education Commission	Types	Non Maori , Education , Government	
	Tertiary Education Commission	Superclass	Null	
	Tertiary Education Commission	Name	Education Review Office	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Tertiary Education Commission location	Street Address	1 Ash Rd	
		Suburb	Manukau	
		City	Manukau	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	2104	

Maori Education Trust

Total ontologies of Maori Education Trust: 5

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Maori Education Trust	Organization	has location	Maori Education Trust location	Address
Maori Education Trust	Organization	provide	assistance to maori students	Activity For
Maori Education Trust	Organization	is	successor to the maori Education	Activity For
Maori Education Trust	Organization	has scholarships	for maori student	Activity For
Maori Education Trust	Organization	received	portion of maori Freehold land income	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Maori Education Trust	Types	Non Maori , Education , Government	
	Maori Education Trust	Superclass	Nil	
	Maori Education Trust	Name	Maori Education Trust	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Maori Education Trust location	Street Address	IT Building, Te Whiti Park , 170a Whites Line East	
		Suburb	Waiwhetu	
		City	LOWER HUTT	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	5010	

Te Mangai Paho

Total ontologies of Te Mangai Paho: 13

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Te Mangai Paho	Organization	has location	Te Mangai Paho location	Address
Te Mangai Paho	Organization	has internal department	iwi radio	Internal Department
Te Mangai Paho	Organization	has internal department	Maori language agency	Internal Department
Te Mangai Paho	Organization	has internal department	Maori Language Quality Assessment	Internal Department
Te Mangai Paho	Organization	approved	Maori Language Strategy	Activity For
Te Mangai Paho	Organization	promot	Maori Language	Activity For
Te Mangai Paho	Organization	provide	Maori Language Conetnet	Activity For
Te Mangai Paho	Organization	Establish	Maori language advisor	Activity For
iwi radio	Internal department	has	purpose	Activity For
Maori language agency	Internal department	promote	Maori Language and culture	Activity For
Maori Language Quality Assessment	Internal department	increase	language proficiency	Activity For
Class	Instance	Properties	Value	
Organization : Types , Name				
	Te Mangai Paho	Types	Non Maori , Education , Government	
	Te Mangai Paho	Superclass	Null	
	Te Mangai Paho	Name	Te Mangai Paho	

Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Te Mangai Paho location	Street Address	Te Puni Kōkiri House, Level 2 , 143 Lambton Quay	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6011	

New Zealand Qualification Authority (NZQA)

Total ontologies of New Zealand Qualification Authority: 8

Subject	Subject Class / URL	Predic ate	Object	Object Class / URL
New Zealand Qualification Authority	Organization	has locatio n	New Zealand Qualification Authority location	Address
New Zealand Qualification Authority	Organization	not provid ing	schools in the Pacific	Activity For
New Zealand Qualification Authority	Organization	record	ethnicity	Activity For
New Zealand Qualification Authority	Organization	suppo rt	maori language proficiency tests	Activity For
New Zealand Qualification Authority	Organization	plan	maori education and training	Activity For
New Zealand Qualification Authority	Organization	contri buting	maori Education Plan	Activity For
New Zealand Qualification Authority	Organization	seeks	advice from Ethnic and Pacific people	Activity For
New Zealand Qualification Authority	Organization	contri bute	maori and Pasifika learner achievement	Activity For
Class	Instance	Prope rties	Value	
Organization : Types , Name				

	New Zealand Qualification Authority	Types	Non Maori , Education , Government	
	New Zealand Qualification Authority	Super class	Nill	
	New Zealand Qualification Authority	Name	New Zealand Qualification Authority	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	New Zealand Qualification Authority location	Street Address	Level 13 125 The Terrace	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6011	

Education Counts

Total ontologies of Education Counts: 5

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Education Counts	Organization	has location	Education Counts Location	Address
Education Counts	Organization	especially marked	maori and Pasifika	Activity For
Education Counts	Organization	enroled	maori and Pasifika	Activity For
Education Counts	Organization	identifiyng	pasifika students	Activity For
Education Counts	Organization	select	student ethnicity	

Class	Instance	Properties	Value	
Organization : Types , Name				
	Education Counts	Types	Non Maori , Education , Government	
	Education Counts	Superclasses	Nil	
	Education Counts	Name	Education Counts	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Education Counts Location	Street Address	Ministry of Education , Mātauranga House	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6140	

9.5 Table A5 : Spread sheet for Language & Culture sector :

Ontology Relation & Class Structure of Language and Culture Sector

Total Ontology: 35

Maori Language Commission

Total ontologies of Maori Language Commission: 11

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Maori Language Commission	Organization	has location	Maori Language Commission Location	Address
Maori Language Commission	Organization	has Internal Department	Māori Language Advisory Group	Internal Department
Maori Language Commission	Organization	has Internal Department	Research Projects	Internal Department
Maori Language Commission	Organization	has Internal Department	Maori language workforces	Internal Department
Maori Language Commission	Organization	Rests	Maori Bill	Activity for
Maori Language Commission	Organization	Funding	Maori Language	Activity for
Maori Language Commission	Organization	Involved	Community Based Language Initiatives	Activity for
Maori Language Commission	Organization	Broadcast	Maori Story	Activity for
Research Projects	Internal Department	Designed	Maori language sector	Activity for
Maori language workforces	Internal Department	Participating	Examinations system	Activity for
Class	Instance	Properties	Value	
Organization : Types , Name				

	Maori Language Commission	Types	Maori , Language , Government	
	Maori Language Commission	Superclass	Null	
	Maori Language Commission	Name	Maori Language Commission	
Internal Department: Superclass, Types, Name				
	Māori Language Advisory Group	Superclass	Maori Language Commission	
	Māori Language Advisory Group	Type	Maori, Language	
	Māori Language Advisory Group	Name	Māori Language Advisory Group	
	Research Projects	Superclass	Maori Language Commission	
	Research Projects	Type	Maori, Research	
	Research Projects	Name	Research Projects	
	Maori language workforces	Superclass	Maori Language Commission	
	Maori language workforces	Type	Maori, Language	
	Maori language workforces	Name	Maori Language Workforces	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Maori Language Commission Location	Street Address	Investment Centre Level 14/20 Ballance St	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6011	

Maori Television

Total ontologies of Maori Television: 14

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Maori Television	Organization	has location	Maori Television Location	Addresses
Maori Television	Organization	provides	sense of connection to maori language and culture	Activity for
Maori Television	Organization	covered	Chairman' review	Activity for
Maori Television	Organization	believes	in policies about maori programme	Activity for
Maori Television	Organization	has made	contribution towards maori language	Activity for
Maori Television	Organization	aims	to maintain flexibility in funding	Activity for
Maori Television	Organization	broadcast	maori programmes	Activity for
Maori Television	Organization	get fund	From Government	Activity for
Maori Television	Organization	does not require	collateral	Activity for
Maori Television	Organization	has consistently reported	surpluses	Activity for
Maori Television	Organization	has rights	to any future exploitation of the programme for non-broadcast uses	Activity for
Maori Television	Organization	has	language strategy	Activity for
Maori Television	Organization	promote	Maori language culture	Activity for
Maori Television	Organization	will broadcast	minimum of 50 percent Maori language programme	Activity for
Class	Instance	Properties	Value	
Organization : Types , Name				
	Maori Television	Types	Maori , Language , Culture , Government	
	Maori Television	Superclass	Null	

	Maori Television	Name	Maori Television	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Maori Television Location	Street Address	9-15 Davis Crescent	
		Suburb	Newmarket	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1023	

TVNZ

Total ontologies of TVNZ: 10

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
TVNZ	Organization	has location	TVNZ Location	Address
TVNZ	Organization	has Internal department	New Zealand Symphony Orchestra Westfield Style Pasifika	Internal department
TVNZ	Organization	provide	transmission programmes to Pacific nations	Activity For
TVNZ	Organization	provide	Pacific nations programmes	Activity For
TVNZ	Organization	established	Pacific Television Service	Activity For
TVNZ	Organization	established	students of Pacific Island or ethnicity	Activity For
TVNZ	Organization	assist	transmission of TVNZ programmes to Pacific	Activity For
TVNZ	Organization	continued	New Zealand Symphony Orchestra Westfield Style Pasifika Scholarship	Activity For

TVNZ	Organiz ation	provide	Maori Language Week Awards	Activity For
TVNZ	Organiz ation	Promotes	Maori language and culture	Activity For
Class	Instanc e	Properties	Value	
Organization : Types , Name				
	TVNZ	Types	Maori , Language , Culture , Government	
	TVNZ	Superclass	Null	
	TVNZ	Name	TVNZ	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	TVNZ Locatio n	Street Address	TVNZ, Corner Hobson Street and Victoria Street West	
		Suburb	Auckland CBD	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1140	

9.6 Table A6 : Spread sheet for Finance sector

Ontology Relation & Class Structure of Finance Sector

Total Ontology: 46

Ministry of Business

Total ontologies of Ministry of Business: 10

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Ministry of Business	Organization	has location	Ministry of Business location	Address
Ministry of Business	Organization	has Internal Department	Pacific Economic Strategy Action Plan	Internal Department
Ministry of Business	Organization	has Internal Department	maori and Pasifika Trades Training	Internal Department
Ministry of Business	Organization	prioritise	Pacific People	Activity for
Ministry of Business	Organization	provide	maori Economic Development Advisory Board	Activity for
Ministry of Business	Organization	train	maori and Pasific people	Activity for
Ministry of Business	Organization	has Budget	fro maori	Activity for
Pacific Economic Strategy Action Plan	Internal Department	support	Pacific peoples	Activity for
maori and Pasifika Trades Training	Internal Department	will increase	number of maori and Pasifika trades	Activity for
Class	Instance	Properties	Value	
Organization : Types , Name				
	Ministry of Business	Types	Non Maori , Economy, Finance , Government	
	Ministry of Business	Superclass	Nil	
	Ministry of Business	Name	Ministry of Business	

Internal Department: Superclass, Types, Name				
	Pacific Economic Strategy Action Plan	Superclass	Ministry of Business	
	Pacific Economic Strategy Action Plan	Type	Non Maori , Economy, Finance , Government	
	Pacific Economic Strategy Action Plan	Name	Pacific Economic Strategy Action Plan	
	maori and Pasifika Trades Training	Superclass	Ministry of Business	
	maori and Pasifika Trades Training	Type	Non Maori , Economy, Finance , Government	
	maori and Pasifika Trades Training	Name	maori and Pasifika Trades Training	
	Tertiary Education Commission	Superclass	Ministry of Education	
	Tertiary Education Commission	Type	Maori, Education	
	Tertiary Education Commission	Name	Tertiary Education Commission	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Ministry of Business location	Street Address	15 Stout Street	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6011	

Ministry of Primary Industry

Total ontologies of Ministry of Primary Industry: 15

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Ministry Of Primary Industry	Organization	has location	Ministry Of Primary Industry location	Address
Ministry Of Primary Industry	Organization	has Internal Department	maori agribusiness programme	Internal Department
Ministry Of Primary Industry	Organization	support	development of maori agribusiness	Activity for
Ministry Of Primary Industry	Organization	worked	maori Land Court on liability issues	Activity for
Ministry Of Primary Industry	Organization	providers	training for partnering	Activity for
Ministry Of Primary Industry	Organization	develop	maori leadership programme	Activity for
Ministry Of Primary Industry	Organization	investing	maori agribusiness	Activity for
Ministry Of Primary Industry	Organization	is actively collaborating	maori	Activity for
Ministry Of Primary Industry	Organization	work	owners of maori land	Activity for
Ministry Of Primary Industry	Organization	provides	participation of maori publicly consults	Activity for
Ministry Of Primary Industry	Organization	achieved	obligations to maori	Activity for
Ministry Of Primary Industry	Organization	support	maori exporting efforts	Activity for
Ministry Of Primary Industry	Organization	administers	maori Crown forests forestry assets	Activity for
Maori Agribusiness Programme	Internal department	aligns	five drivers of productivity	Activity for
Class	Instance	Properties	Value	

Organization : Types , Name				
	Ministry Of Primary Industry	Types	Non Maori , Economy, Finance , Government	
	Ministry Of Primary Industry	Superclass	Nil	
	Ministry Of Primary Industry	Name	Ministry Of Primary Industry	
Internal Department: Superclass, Types, Name				
	maori agribusiness programme	Superclass	Ministry of Business	
	maori agribusiness programme	Type	Non Maori , Economy, Finance , Government	
	maori agribusiness programme	Name	Ministry Of Primary Industry	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Ministry Of Primary Industry location	Street Address	Ministry for Primary Industries Pastoral House 25 The Terrace	
		Suburb	Wellington	
		City	Wellington	
		Region	Wellington	
		Country	New Zealand	
		Postal Code	6140	

Careers.govt.nz

Total ontologies of Careers.govt.nz: 3

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Careers.govt.nz	Organization	Has location	Careers.govt.nz location	Address
Careers.govt.nz	Organization	improve	education to employment outcomes for maori	Activity for
Careers.govt.nz	Organization	Improve	higher education for maori	Activity for
Class	Instance	Properties	Value	
Organization : Types , Name				
	Careers.govt.nz	Types	Non Maori , Education , Government	
	Careers.govt.nz	Superclass	Null	
	Careers.govt.nz	Name	Careers.govt.nz	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Careers.govt.nz location	Street Addresses	65 New North Road	
		Suburb	Eden Terrace	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1021	

Auckland Council

Total ontologies of Auckland Council: 13

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Auckland Council	Organization	has location	Auckland Council location	Address
Auckland Council	Organization	has Internal department	RWC 2011 planning	Internal department
Auckland Council	Organization	has Internal department	Pacific Art Summit	Internal department
Auckland Council	Organization	have	obligations to the maori community	Activity for
Auckland Council	Organization	provides	community development programmes for Pacific Islander	Activity for
Auckland Council	Organization	draws	advice from the Pacific Peoples	Activity for
Auckland Council	Organization	seeks	advice from Ethnic and Pacific people	Activity for
Auckland Council	Organization	emphasised	Pacific Peoples	Activity for
Auckland Council	Organization	train	maori and Pasifika people	Activity for
Auckland Council	Organization	assist	maori people	Activity for
Auckland Council	Organization	increase	maori employment	Activity for
Auckland Council	Organization			Activity for
RWC 2011 planning	Internal department	had to take	account the Pacific Island Forum	Activity for
Class	Instance	Properties	Value	
Organization : Types , Name				

	Auckland Council	Types	Non Maori , Education , Government	
	Auckland Council	Superclass	Nill	
	Auckland Council	Name	Auckland Council	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Auckland Council location	Street Address	Auckland Council , City Government Office , 135 Albert St	
		Suburb	Auckland CBD	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1010	

Accident Compensation Corporation (ACC)

Total ontologies of Accident Compensation Corporation (ACC): 5

Subject	Subject Class / URL	Predicate	Object	Object Class / URL
Accident Compensation Corporation (ACC)	Organization	has location	Accident Compensation Corporation (ACC) Location	Address
Accident Compensation Corporation (ACC)	Organization	has internal department	awareness of the ACC Scheme	Internal department
Accident Compensation Corporation (ACC)	Organization	support	Pacific clients	Activity for
Accident Compensation Corporation (ACC)	Organization	improve	proficiency levels to Pacific people	Activity for
awareness of the ACC Scheme	Internal department	improving	Pacific peoples	Activity for

Class	Instance	Properties	Value	
Organization : Types , Name				
	Accident Compensation Corporation (ACC)	Types	Non Maori , Education , Government	
	Accident Compensation Corporation (ACC)	Superclasses	Nil	
	Accident Compensation Corporation (ACC)	Name	Accident Compensation Corporation (ACC)	
Address : Street Address, Suburb , City, Region, Country , Postal Code				
	Accident Compensation Corporation (ACC) Location	Street Address	18 Sale Street	
		Suburb	Auckland	
		City	Auckland	
		Region	Auckland	
		Country	New Zealand	
		Postal Code	1010	

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