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KHALID

STANDARDIZATION OF HUMANITARIAN PROJECTS MONITORING AND EVALUATION CYCLE USING SEMANTIC WEB

Nicosia
JANUARY
2023

NEAR EAST UNIVERSITY
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MSc. THESIS

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Nicosia
JANUARY 2023

Approval

We certify that we have read the thesis submitted by Wafaa Ibrahim Khalid titled **"Standardization of Humanitarian Projects Monitoring and Evaluation Cycle Using Semantic Web"** and that inour combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Educational Sciences.

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I hereby declare that all information in this document has been obtained and presented following academic rules and ethical conduct. As required by these rules and behaviour, I have fully cited and referenced all material and results that are not original to this work.

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To my family

Acknowledgements

Thank and praise God for this great blessing. I highly appreciate the unconditional support of my supervisor Prof. Dr Melike Şah Direkoglu. I am honoured to be one of her students. I appreciate great efforts of the professors of the Department of Computer Engineering, NEU.

Many thanks to Dr Abdul Al-Sattar Ahmed for supporting me. All of my family members Kordeen,Veen,Ahmed.Fakhry. have been the best advocate for me in my long academic career. Many Thanks to my dear husband Khary. for his patience and endurance. Thank you very much to my beautiful friend and daughter Kordeen, I will never forget my dear sister Amal: Thank you very much.

Abstract

Standardization of Humanitarian Projects Monitoring and Evaluation Cycle Using Semantic Web

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January 2023, Page 140

Every year, the world faces many different wars and conflicts that have claimed the lives of tens of thousands of vulnerable people, and many people have lost their homes or lands. Because of these wars, millions of people worldwide each year face difficulty in accessing basic life services that are a right for all, such as (i.e. clean water, food, education, health care, etc.). Elimination of livelihoods and lack of access to essential services had been significant reasons for increasing mainly risks, around the world.

This thesis particularly focuses on humanitarian works in Iraq. During recent years, many Non-Government Organizations (NGOs), local and international, have been concerned about the need to access humanitarian projects data easily and faster. However, heterogeneous data about humanitarian projects are required to be collected, and this can be a challenging task. To address this problem, in this thesis, our goal is to exploit the capabilities of the Semantic Web for data integration using ontologies. In particular, data about humanitarian project monitoring and evaluation will be gathered in a machine-understandable format using the created ontologies. In this context, we have abundant amount of different data about the project cycle and will populate the knowledge based regarding to the created ontologies. Using the created metadata, it is possible to automatically query using SPARQL query language that allows detailed searches over the created metadata. Thus, it enables saving time and efforts for data access. Furthermore, new knowledge can be inferred using extensive semantic rules called Semantic Web Rule Language (SWRL). In our context, we exploit several rules to gather more knowledge about project activities and project outcomes.

To summarize, we created a new humanitarian project monitoring and evaluation ontology to regulate the information for all phases of humanitarian projects. The main

concepts of the ontology are participants, employees, and project activities for different types of projects, including essential services, health, and education. Then, extensive queries are demonstrated to show querying capabilities, and SWRL rules are generated to extract further new knowledge about project activities and outcomes. Metadata quality evaluations are also presented.

Keywords**:** humanitarian relief, humanitarian projects, monitoring and evaluation, ontologies, semantic web, semantic rules, sparql**.**

Özet

Semantik Web Kullanılarak İnsani Yardım Projelerinin İzleme ve Değerlendirme Döngüsünün Standartlaştırılması

VAFAA İBRAHİM HALİD

MSc. Bilgisayar Mühendisliği Bölümü

Ocak 2023, Sayfa 140

Dünya, her yıl on binlerce savunmasız insanın hayatına mal olan birçok farklı savaş ve çatışmayla karşı karşıya kalıyor ve birçok insan evlerini veya topraklarını kaybediyor. Bu savaşlar nedeniyle her yıl dünya çapında milyonlarca insan herkesin hakkı olan temel yaşam hizmetlerine (temiz su, gıda, eğitim, sağlık vb.) erişimde zorluk yaşıyor. Geçim kaynaklarının ortadan kalkması ve temel hizmetlere erişimin olmaması, dünya çapında başlıca risklerin artmasının önemli nedenleri olmuştur.

Bu tez özellikle Irak'taki insani yardım çalışmalarına odaklanmaktadır. Son yıllarda, yerel ve uluslararası birçok Sivil Toplum Kuruluşu, insani yardım projeleri verilerine kolay ve hızlı erişim ihtiyacı konusunda endişe duymaktadır. Ancak, insani yardım projeleri hakkında heterojen verilerin toplanması gerekmektedir ve bu zorlu bir görev olabilir. Bu sorunu ele almak için, bu tezde amacımız, ontolojileri kullanarak veri entegrasyonu için Semantik Web'in yeteneklerinden yararlanmaktır. Özellikle insani yardım projelerinin izlenmesi ve değerlendirilmesine ilişkin veriler, oluşturulan ontolojiler kullanılarak makine tarafından anlaşılabilir bir formatta toplanacaktır. Bu bağlamda, proje döngüsü hakkında yeterli miktarda farklı veri oluşturulan ontolojilere dayalı olarak elde edeceğiz. Oluşturulan metadata üzerinden, detaylı arama yapılmasına olanak sağlayan SPARQL sorgulama dili kullanılarak otomatik olarak sorgulama yapılabilmektedir. Böylece veri erişimi için zamandan ve emekten tasarruf edilmesini sağlamayı amaçlamaktayız. Ayrıca, Semantik Web Kural Dili adı verilen kapsamlı anlamsal kurallar kullanılarak yeni bilgiler çıkarılabiliriz. Bu tezde insane yardım proje faaliyetleri ve proje sonuçları hakkında daha fazla bilgi toplamak için çeşitli kurallardan yararlanmaktayız.

Özetlemek gerekirse, insani yardım projelerinin tüm aşamalarına ilişkin bilgileri düzenlemek için yeni bir insani proje izleme ve değerlendirme ontolojisi oluşturduk. Ontolojinin ana kavramları, temel hizmetler, sağlık ve eğitim dahil olmak üzere farklı proje türleri için katılımcılar, çalışanlar ve proje faaliyetleridir. Ardından, sorgulama

yeteneklerini göstermek için kapsamlı sorgular göstermiş olup, proje faaliyetleri ve sonuçları hakkında daha fazla yeni bilgi çıkarmak için Semantic Web kuralları oluşturulmuştur. Meta veri kalite değerlendirmeleri de sunulmaktadır.

Anahtar Sözcükler: İnsani yardım, insani projeler, izleme ve değerlendirme, ontolojiler, semantik ağ, semantik kurallar, sparql.

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List of Abbreviations

BOQ: Built of quantity

FQD: Focus Group Discussion

FSL: Food security and livelihood

GBV: Gender-based Violence

HP: Hagen Promotion

HR: Human Resource

HXL: Humanitarian exchange Language

IDPs: Internally displaced persons

INGOs: International None Government Organization

KII: Key Inform Indusial

M&E: Monitoring and Evaluation

NGO: Non-government organization

OWL: Web Ontology Language

PDM: Post distribution monitoring

Pic: picture

PSS: Psychosocial Support Services

RDF: Resource Description Framework

Refuges: External displaced Persons

SPARQL: SPARQL Protocol and RDF Query Language

Tec: Technical

URI: Uniform Resource Identifier

URL: Uniform Resource Locator

W3C: World Wide Consortium

WASH: Water, Sanitation and Hygiene

WWW: World Wide Web

CHAPTER I

Introduction

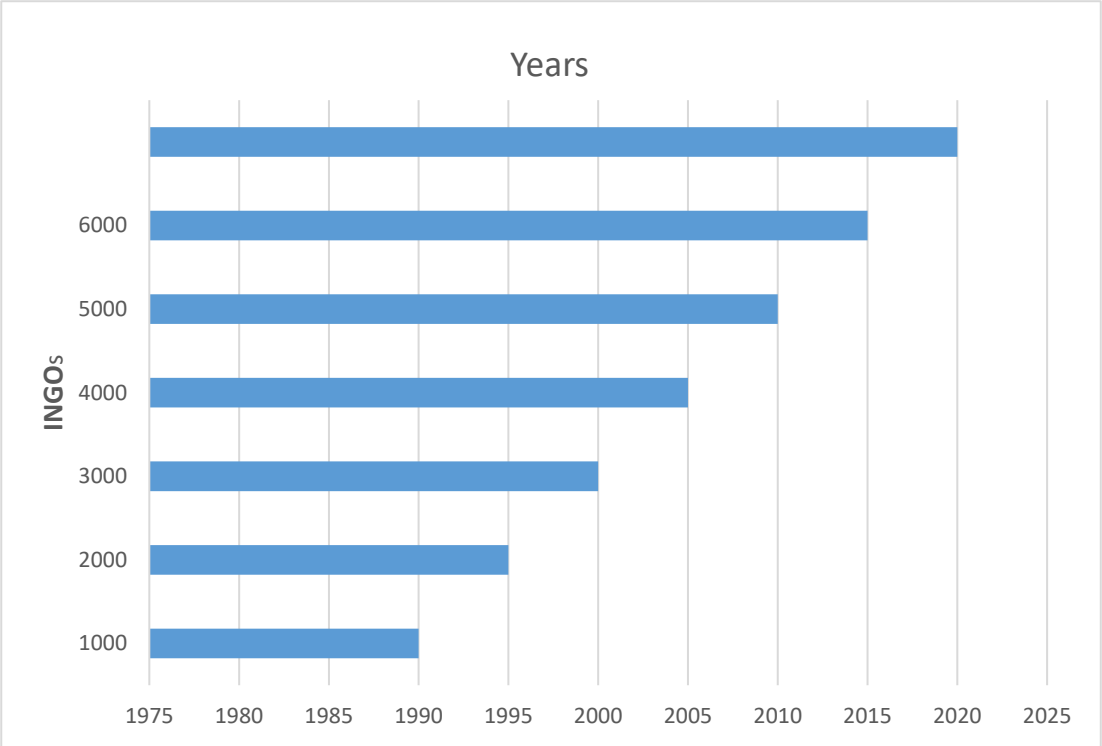
In this chapter, we represent all thesis in short and what we prepare to introduce it through this thesis. Long years of conflicts and wars, especially in third-world countries, caused thousands of victims and displaced millions. With infrastructure and livelihoods destroyed and basic services lost, these peoples need humanitarian assistance. (Sowers & Weinthal, 2021). As one of the humanitarian organization's staff in Iraq, we have been mainly focused on humanitarian work from the beginning until now. There are many Non-Government Organizations (NGOs) that implement humanitarian projects through the donor. In different sectors, such as health care, protection, education, and Food Security and Livelihood (FSL), Water Sanitation and Hygiene (WASH) program (Evans.A,2009).

It is the responsibility of the departments to evaluate the results of their work from the implementation of these types of projects annually. This assessment can be achieved by knowing the extent to which the goals are reached. For example, an accurate analysis of the level of implemented projects that includes collecting the required data, work plans, preparing employees, documenting records, and Recording results. Document successes and strengths points, challenges, and weaknesses are essential to take advantage of strengths and errors encountered during implementation of the humanitarian project. Thus, the same mistakes do not occur in other projects. If these unexpected challenges are also repeated during implementation, then these lessons should be taken advantage for future projects to benefit from time and money, with possible causes. Furthermore, preparation of documentations increases donors number to trust the technical of NGOs team, during the implementation of the humanitarian projects (Summerfield, 1996).

Figure 1, shows a graphical, representation the increasing number of INGO, and NGOs between 1951 and 2012 in Iraq.

Figure 1: *Increasing number of INGOs and NGO.*

Source: Author,2022.



The evaluation department of a humanitarian project, has many challenges, particularly if the project is in a complex area. In this case, work relies on the data proven in the documents or official records provided by Monitoring and Evaluation of Progress Department. In this context, good documentation is crucial. Therefore, developments occurred in this regard for many international donor agencies as well as local ones. A variety of modern monitoring and evaluation systems and tools have emerged, and developed rapidly based on the goals and requirements of the activities that are being implemented goal. (OECD LEED Forum on Partnerships and Local Governance,2006) (Crawford& Bryce,2003).

We started building our own ontology and entering all the data related to the project's activities, such as the number of courses and type, names of participants and employees, and how much they benefit from the project and various types of data to obtain a base of data to be dealt with, which will be used in the process of automatic evaluation of the project phases. This evaluation will be characterized by accuracy and will save effort and time after analyzing the results extracted for all Effective

project activities. All of these results are achieved by querying using the semantic web. We will reach the desired goal, which is an accurate assessment that will help the future of assessment. It is what humanitarian organizations, especially donors, look forward to, as it will make sure that these funds are used appropriately.

Thesis Problem

Charitable projects are needed by vulnerable people, which they desperately need, such as clean water, health, education, and Protection. Emphasis on the absence of any deception during the implementation of humanitarian projects and the resource is dealt
with accurately until it reaches the beneficiaries when implementing these projects.

There will undoubtedly be an increase in the number of donors worldwide when the Monitoring and Evaluation Department for Humanitarian Projects provides the data there will be an increase in speed and accuracy in obtaining results, and most of all, there will be no reliance on predictions or the personal intuition of the assessor.
Or on anonymous measurements, for previously implemented projects, whose data has been previously entered, unlike what is found in the features According to the Semantic Web, this system can process results and automatically link them together. This makes it possible to make a detailed and accurate evaluation. This automated evaluation of the project cycle will have the ability to respond to many unclear inquiries about the next step of the project, for example. These results will increase the capabilities of humanitarian projects. This problem will be in this thesis, but there is still a need for more. Monitoring and evaluation systems are constantly evolving, and we will need to continually update as well to produce high-quality results.

The Aim of the Thesis

In this work, a new ontology is created for monitoring and evaluation of humanitarian projects organized by NGOs. The aim of the work can be explained as follows:

• We use ontologies for data re-usability and machine to machine inter-operability.

• The main categories of the created ontology include, monitoring, evaluation, projects, employees, participants, events and more.

• Our ontology is populated with real data about humanitarian projects in Iraq.

Mainly, this data will be about the number and names of participants in activities, names of employees, activity data for all courses, types of distributions, locations, etc.

• Semantic Web query language SPARQL is applied to allow extensive queries against the created knowledgebase.

• SWRL rules are created for the evaluation and monitoring, as well as for inferring new data from the existing knowledge.

• Metadata quality is assessed using a metadata quality assessment procedure.

Limitations of the Study

One of the study's limitations is that most of the documents regarding international organizations were not accessible, especially the documents tracking to the Monitoring and Evaluation Department, which is one of the most important part of our work. It contains many documents that show major weaknesses and points that led to a decrease in the results of some projects, and these documents may stop some NGOs from working.

Overview of the Thesis

The rest of the thesis is organized as follows: Chapter two provides a comprehensive explanation of related works in the field of humanitarian projects and technology. The third chapter discusses details of the work of humanitarian organizations and the details of all their departments, all by linking them to the Department of Monitoring and Evaluation and how they use the primary tools for assessment. Chapter four introduces the Semantic Web and its technologies. Chapter five we will introduce the Proposed Humanitarian Project Monitoring and Evaluation Ontology. As for the sixth chapter, SPARQL queries and results are presented. Chapter seven introduces our SWRL Rules for querying and reasoning. Chapter eight presents evaluations and metadata quality assessment results. Finally, chapter nine is conclusions and future works.

CHAPTER II

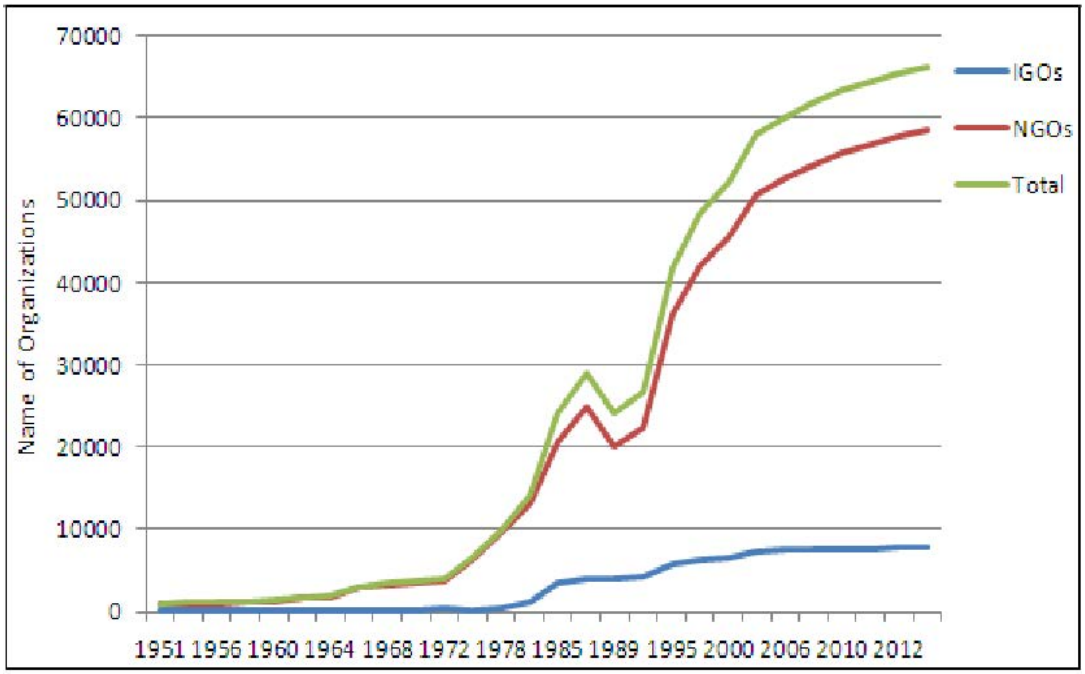
Related Work

In this chapter, we present related works. According to (Modgil, Singh & Foropon,2020), the history of the role technology has played in producing and reproducing global scientific disparities is recorded in documents and records. However, (Roth & Luczak-Roesch, 2018) described the history of the development of global technology and how it caused shortening the distances between the rich and the poor. Processing it and then storing it, and using it here is called the life cycle of digital data. (Fan& Zlatanova,2011) described how important these electronic technologies are in humanitarian work.

(Shamoug et al., 2014d) explain how to apply ontology to emergency management response. In particular, the emergency response is an activity to be reckoned with. Two challenges to be faced are several actors and heterogeneous spatial information to be transferred to another actor in addition to the other challenge, which is integration. Authors address these challenges by data transformation through the semantic web for any of the emergency response situations through the application of ontology; the required data is extracted from the user forms, and a dynamic ontology is used for the data in context. Here, authors described the importance of reports on the humanitarian situation, describing them as the backbone and linking them to crisis response with decision-making, describing them as much greater than the funding on which projects depend. Ontology and SWRL rules are used to describe effective actors and all sources in the event of a crisis. A Java-based application is also provided.

(Smart et al., 2007) explain all about the great interest of military agencies and links it to improving awareness that attention and improvement of the planning process is one of its best to improve the dynamics of decisions concerning military decisions. (AKTiveSATDS), which provides the type of awareness of the conflict and non-conflict stories, by using, technology; the semantic web, and a component of cognitive techniques and visualization priorities. The authors discuss methods for extracting and acquiring knowledge, and the real-time querying of the data using SPARQL queries.

Figure: 2 *Increasing number of INGOs and NGO.*
Source: (Monty,2011).



(Gaur et al., 2019) deal with responsive emergency management by using ontology. Whereas this methodology is called empathy ontology, to take highly accurate interactions and knowledge that include different areas such as natural resources, images from different aspects of satellites, in addition to modern social media and so on. This so-called empathy ontology is taken from several other well-known ontologies, such as Friend of Friend (FOAF), Differential and Open Spectrum Related to Events (LODE), and Simple Knowledge (SKOS). Using different and disparate data, there are many others, and when collecting all these different data and analyzing them, it will be an appropriate aspect of the response to emergency management situations.

In the work of (Liu et al., 2013), there are comprehensive reviews by the authors of about state-of-the-art ontologies in conducting crisis management and emergency response. The group identifies all the important areas that should be dealt with in crisis management. They then discovered that the current ontology programs cover only 65% of these areas, and those future directions are directed towards vocabulary.

Incident management, or what is called emergency response, is a very widespread global management, and there are many scientists and researchers who have worked evaluatingit and help poor countries to rise from this reality.

However, there are very few works that follow disaster / crisis management using ontology, as we found in our search. We did not find a specific approach based on the semantic web in terms of the work of monitoring and evaluating values, especially in relation to humanitarian projects, which should be contributed in which (Karan&Irizarry, 2015). The researcher deal with the life cycle of BIM building information modelling; the project succeeds in the design stage to support the project in the information stage; the BIM is planning before the project, and all data entered, like building elements translated into semantic web data Then, using a query language to access the data in the semantic web but not be acceptable on another stage of the implement of any project.

(El-Radie, 2015) focuses on development of a system that translates SPARQL into Arabic. In this way, it is possible to use Arabic in SPARQL queries. All efforts in SPARQL were strongly focused on the field of English. And for the success of this conversion, SPARQL into Arabic, the stages that you are going through SPARQL query language data first, translations the terms are denoted from the ontology, having an ontology for with SPARQL queries the data can be retrieved. Then, define Arabic language extensions to build query terms for making Arabic sentences. When selecting a group of private to convert parts of SPARQL to Arabic sentences. Repetitive words are parsed, and data is collected to conclude Arabic.

The Semantic Web technologies need to exchange the ontology data to continue to be used (Raul 2008). Because of the difference in homogeneity in the representation of knowledge, there is a difference in current technologies difference in the treatment of inter-discrepancy in the Semantic Web. Work must be done to improve the interoperability of semantic web technologies and the features attached to this technology, as well as there are assessments that can be conducted by consensus, by using reuse tools and methods. (Niehaus, 2018) defines a framework for measuring interoperability and provides detailed interactive operation results.
Many of the projects that have relied on Human service Exchange, like Language (HXL) are intended projects sponsored by the UN Office for the Humanitarian Affairs, this is the first step in technical direction, which now aims to improve

departments for data and their exchange to respond to types of natural or unnatural disasters.

We are still exchanging data in this field and dealing with random environments affected by the confrontations of emergencies such as natural disasters such as earthquakes, volcanoes, or armed conflicts such as wars, which occur by an active act. The goal of HXL is to intervene in the automation of many of these processes, to save time for staff in the field, and to improve access to information. (Keßler & Hendrix, 2015) enables sharing of app limits contents as the main objective of the Semantic Web is to increase the logic of the existing Web because it is a series of rules that enable the Semantic Web, in addition to the complex relationships that will allow machine language to deal with many types of information more dynamically.

We have to understand that the accessibility of the machine in representing information in a way that makes it possible to make inquiries based on the meaning of the data, a lot of applications and current research projects from them and in many fields, and science-based on SW techniques plays a role in not easy to return the information vocabulary as well Terminology and classifications that link many of these projects by adding a formal framework to them, i.e., preparing and defining categories in addition to entities and content, and especially relating them among themselves to develop them in the ontology (Org,Almeida, Souza&Fonseca,2011) .

CHAPTER III

Humanitarian Organizations

Many humanitarian organizations work to support humanity through their activities in many projects they set up in the area. These projects include empowering women, hygiene and clean water support, capacity building and many more that are vital.

Bellow some INGOs name working in Iraq: -

- Concern World-CW
- Danish Refugee Council DRC
- Dorcas
- Gesell schaft für International Zusammenarbeit -GIZ
- Goal
- HOPS
- International Medical Corps-IMC
- INTERNATIONAL ORGANIZATION FOR MIGRATION
- International Rescue Committee-IRC
- Maltese International
- MISSION EAST
- Norwegian Refugee Council –NRC
- Oxfam
- Peace Winds Japan
- Relief International
- UN Refugee Agency UNHCR
- UNESCO
- UNICEF
- Welt Hunger Hilfe-WHH
- World Vision International-WVI

Figure. 2 shows the campsite in Iraq It shows a large number of families and the limited ecological situation.

Figure 3 : *Refugee Camp in Iraq*

Source *Dw, 2022*

The work of these humanitarian organizations is to set up different projects in the affected areas because of these conflicts or wars. The type of projects varies from one region to another, according to the needs.

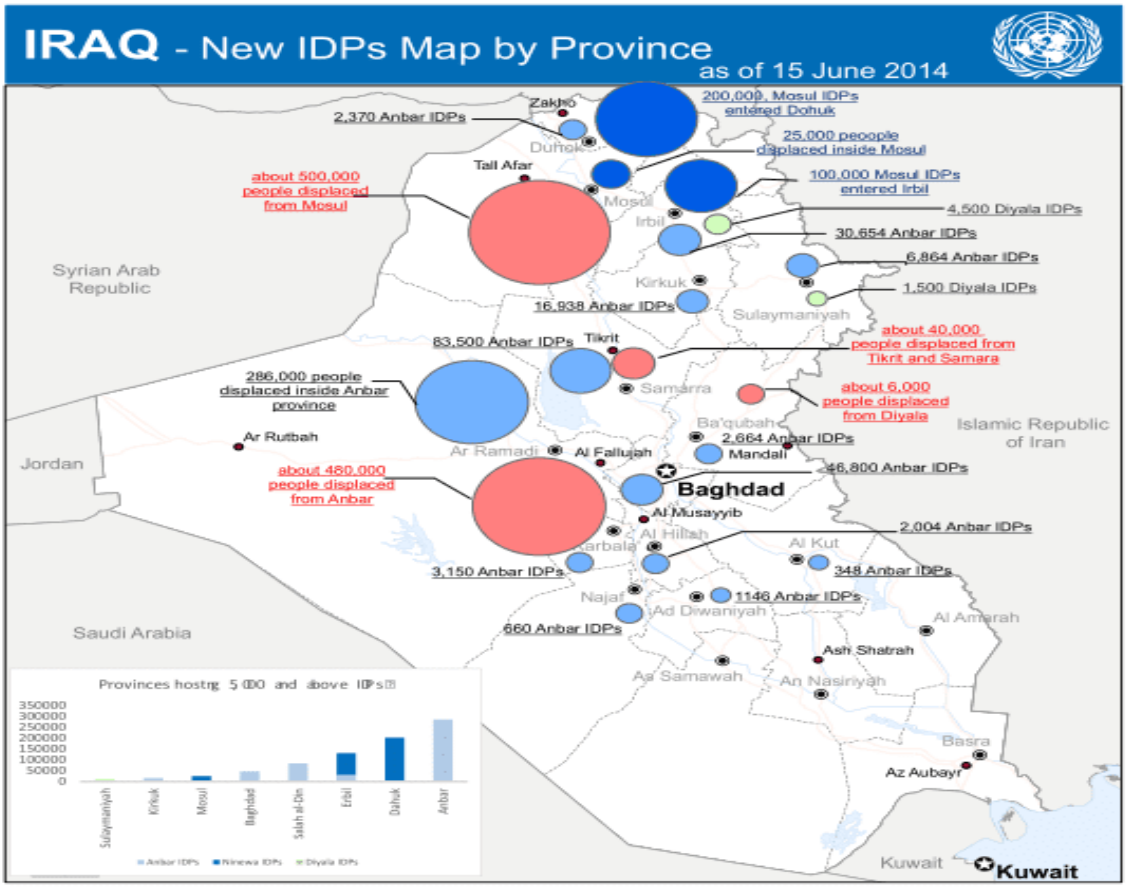
In some areas, service projects are implemented, such as supporting personal hygiene, clean drinking water, construction and maintenance work, and there are other projects to support, build capacities and empower women, and encourage the use of resources and work on youth development, such as building local capacities, which is the main supporter, in order to avoid dependence on external support.

Here, the development department appeared in humanitarian projects, and it is called monitoring and evaluation programs in order to limit errors in these projects, which are committed intentionally or unintentionally.

Figure 3: Map of Iraq camps, which shows a large number of camps in northern Iraq due to the displacement of Iraqis from the central regions in addition to the Syrian refugees.

Figure 4 :*Map of Iraqi camps*.

Source: Pinterest,2014.



Humanitarian Organization Projects

There are many types of humanitarian organization projects. In this work, we deal with the following types of humanitarian project works in the areas of Iraq, Syria, and Yemen.

(Besiou & Van Wassenhove, 2019)

- Education.
- Protection.
- Wash.
- Food Security and Livelihood (FSL).
- Health.

Figure 4 below shows humanitarian projects types and activities for them These activities can be expanded or reduced according to the type of project or the needs identified by that area.

What is (M&E)?

M&E are two systems that work together; and each one complements the other. Although they focus on the same subject, each one has a specific policy and different results to achieve their goals. Monitoring measures the weaknesses and strengths of ongoing projects to reach real success and to find problems/mistakes that may occur during the course of the project. If the project is not progressing, there should be a change of plans.

The follow-up and evaluation process is a typical integrated process for collecting data and then analyzing it. Data can be collected from different technical and non-technical departments in the course of the project implementation process. The Figure 5 show the monitoring is a part of evaluation system. (Sciencedirect,2019)

Figure 5 : *PP Framework.*

Source: Author,2022.

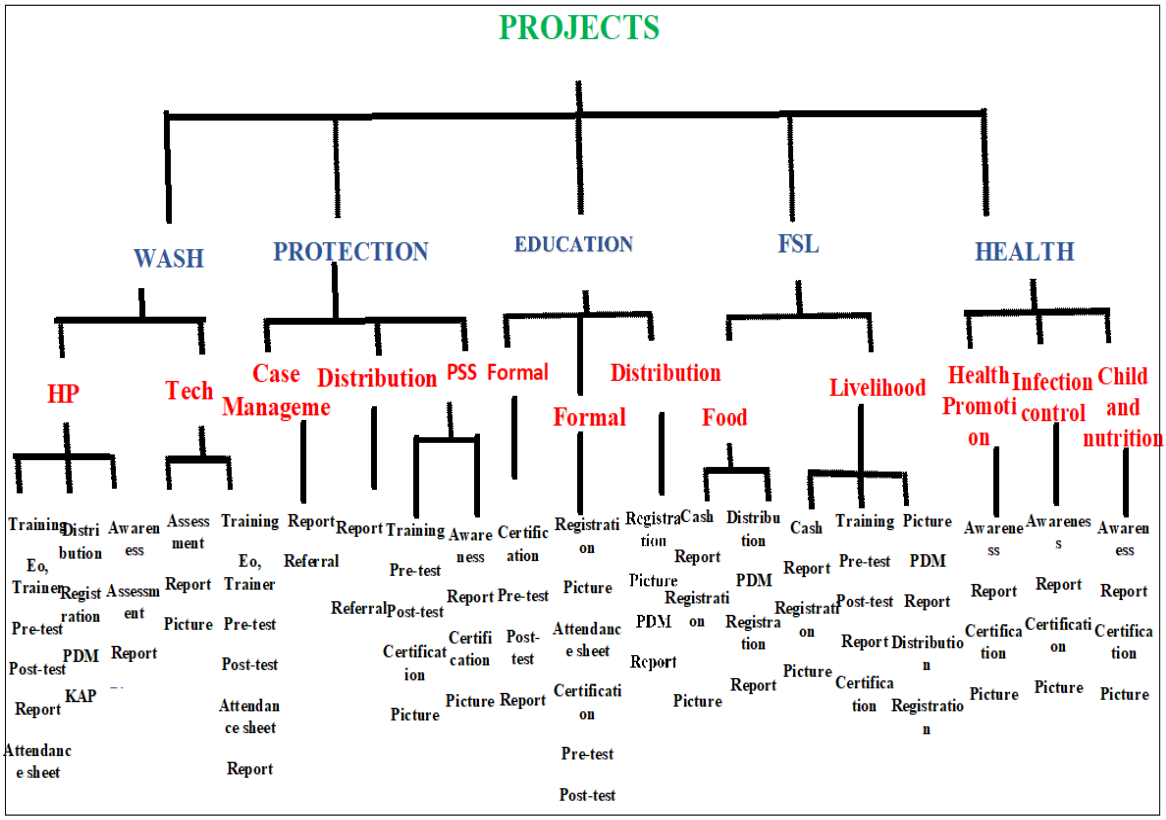


Figure 6:*M&E*

Source: Author,2022.

Purpose of M&E Work can be summarized as follows:

• Designing a successful project implementation process by facilitating the monitor's work to reach results through a variety of methods.

• Development is one of the most important areas that the evaluator aspires to, and he works to obtain it through indicators to measure the results.

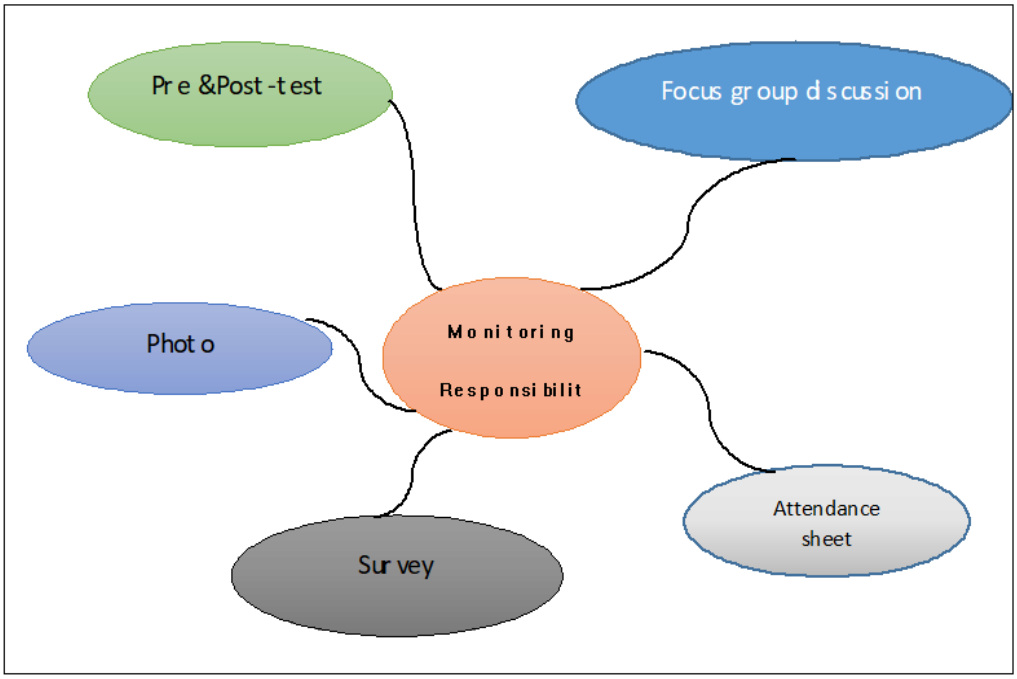
• Collect and analyze information or data for all phases of project activities related to achieving the desired goals and results.

• Identify and measure the errors that occurred during the stages of the project and find out which activities did not achieve the objectives.

• Make the necessary adjustments to avoid mistakes and losses by benefiting from experiences and lessons. (White et al., 2013) The figure 6 show the responsibility for one project.

Figure 7: *Monitoring & Evaluation of projects*.

Source: (Author,2022)



Monitoring

It is known that it is a process that has the ability to control the course of operations from a stage before the start of the project, such as collecting information to start the project, and analyzing it and using it in the project stages to ensure success, credibility, and how much the participants to benefit to the fullest extent of the project resources. A sample procedure is presented for humanitarian projects in Figure 7. The Monitoring Department is to ensure the progress of the technical process in the direction of management decisions. If it turns out that the project is not working with the required steps that were planned, there must be alternative plans that must be followed to change the project's destination to reduce and avoid the expected losses. When starting to develop a monitoring plan, it is essential to prioritize the programs or projects you will monitor to reach the desired goals and according to the necessary resources to monitor all your interventions simultaneously and using modern technologies. So you will need to think about plans for programs or projects that you want to evaluate plus staff; The planned time for this activity, whether it is appropriate, and whether it is an ongoing post-project activity (Riely, Mock, Cogill, Bailey& Kenefick ,1999).

Evaluations

It is a systematic evaluation according to the well-thought-out plan for an activity or Project,
and perhaps for a program consisting of several projects for a company or a humanitarian
organization. (STEM et al., 2005)

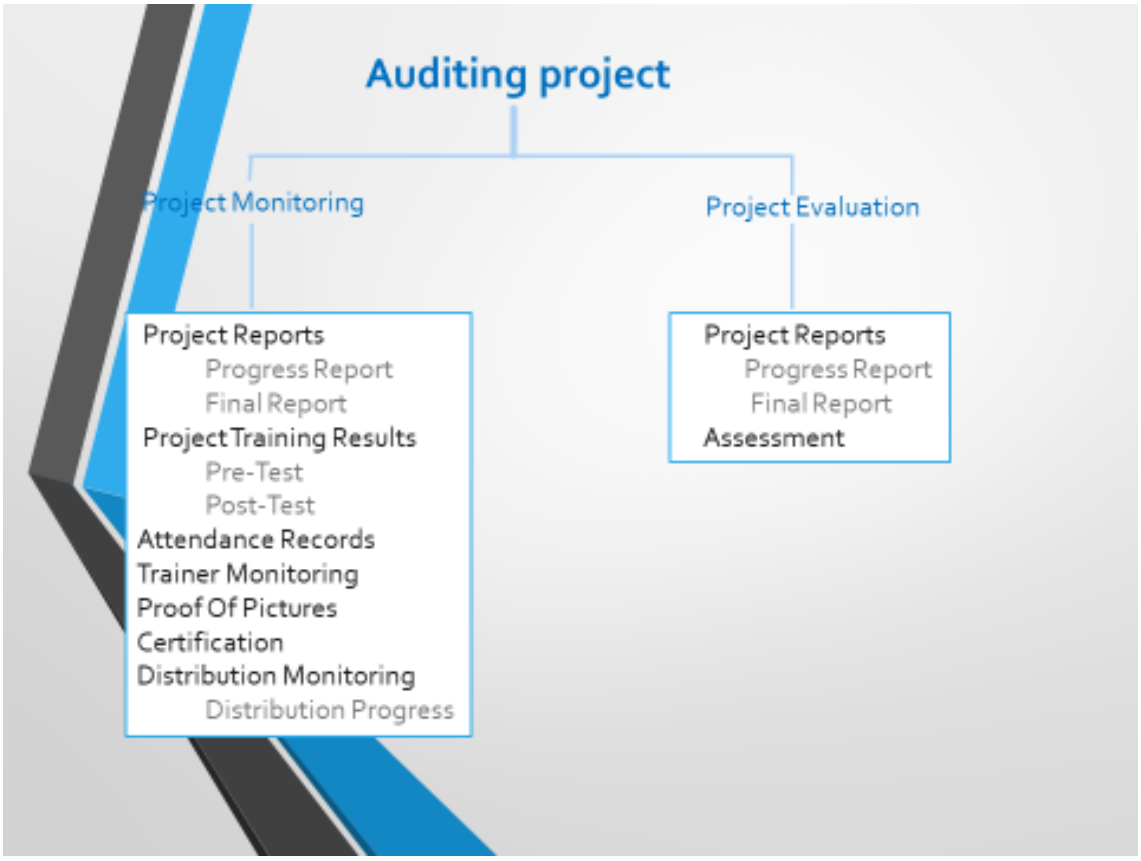
The evaluation could be a strategy for an activity or an evaluation of the performance of an organization, company, or even a sector.

In the projects field, the evaluation focuses on the expected and achieved achievements and is compared according to the achievement of the previously planned goals and the comparison of the series of results (inputs, people, activities, outputs, the achieved impact of the results and their estimation about the assets).

The evaluation plan is to determine the appropriateness, effectiveness, and efficiency of activities and interventions, in addition to their shortcomings and, most importantly, their sustainability, contributions to the intervention, and their access to the achieved results. The fig below shows the responsibility of monitoring and evaluation projects in humanitarian organizations.

Figure 8*:Monitoring & evaluation*.

Source: Author,2022.



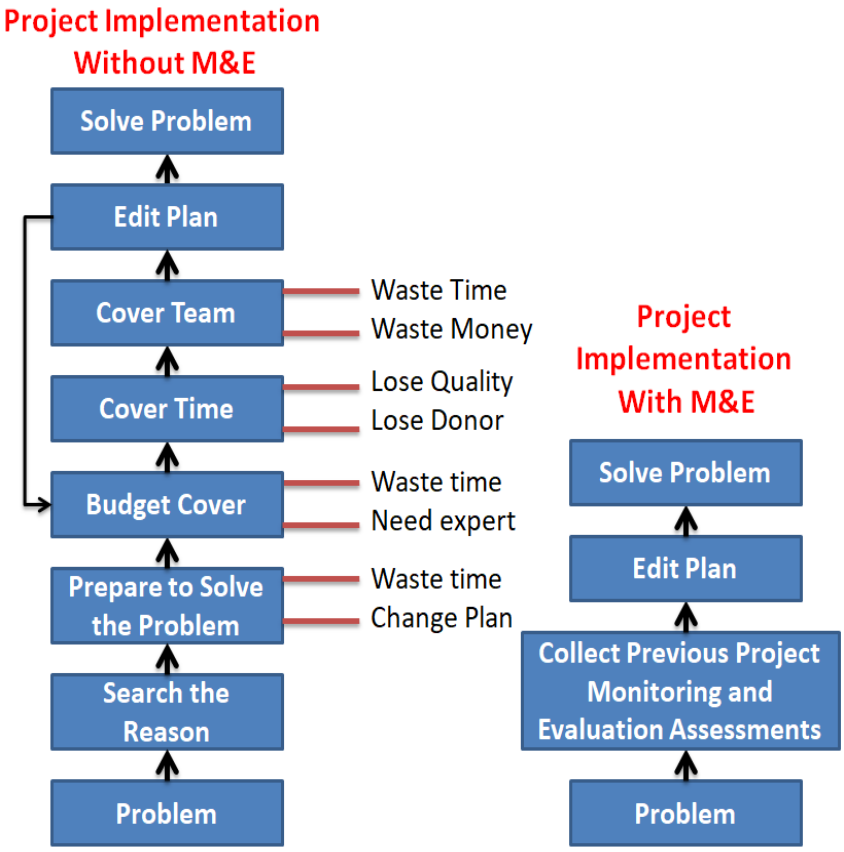
Advantages and Disadvantages of M&E

With project monitoring and evaluation (Figure 8); It is possible to identify errors and measure their percentage during the implementation process, it is possible to determine the strength of the workforce. In addition, quality and safety of the work environment and within the policy and decisions of management is ensured.

Although M&E is crucial, it is an expensive process that requires professional staff, financial resources, and sometimes equipment that creates various kinds of mistrust issues. Furthermore, creating a charged and cautious atmosphere leads to exhaustion in a project. Being too careful with project steps often kills creativity (Megersa,2022).

Figure 9 : *Project Implementation using Monitoring and Evaluation (M&E).*

Source: Author,2022.



CHAPTER IV

Semantic Web

In this chapter, we talk in detail about the semantic web and about its benefits, categories, and capabilities regarding data.

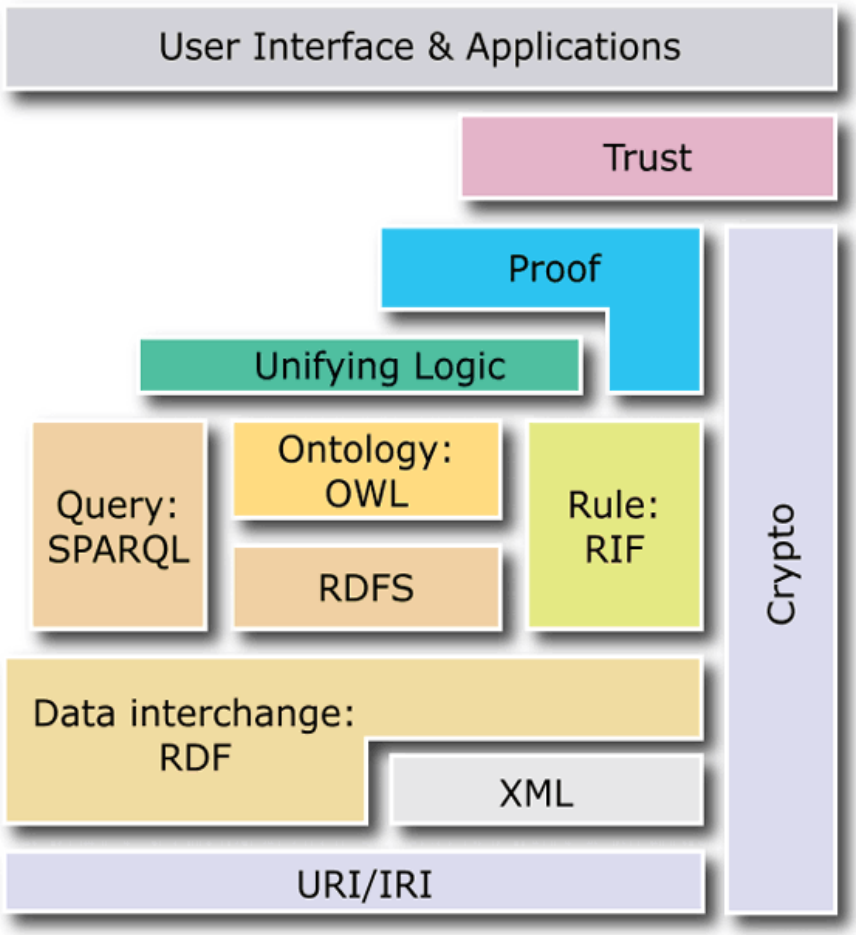
The Semantic Web technologies is a mechanism of , to have the ability to exchange different data, between humans and computers in a standardize format. Tim Berners-Lee (Hendler et al., 2009) is the inventor of the World Wide Web and designer of the Semantic Web ,. His vision of Semantic Web technologies is to support people and machines; machines can understand and process data and can help people.

The Semantic Web technologies aims to prepare the data so that machines can automatically read and process data, as well as, it can then be used for inference, intelligent query and data display (Staab et al., 2006). As for the main challenge that we face in the automated search for data is the handling and processing of these huge amounts of pre-entered data in non-discrete formats (such as text, speech, web, images, maps, video, sound, etc.).(Hitzler et al., 2009)

Using Semantic Web technologies, data from heterogeneous sources can be combined and annotated with a standardized machine-understandable format (Fig. 9). To achieve this, Uniform Resource Identifiers (URIs), Resource Description Framework (RDF) and Web Ontology Language (OWL), SPARQL Query language, Semantic Web Rules (SWRL), and human friendly user interfaces are required, which is discussed in detail below.

Figure 10 :*Semantic Web Technologies Stack.*

Source: E-Editiones.ch, 2022.



Therefore, the use of OWL allows the division of a class hierarchy, characteristics, individuals, and constraints in this environment or field. If the data is transformed into an arrangement for automated processing by URIs, ontologies, and RDF, with accurate results using SPARQL queries. In addition, we can also get a derivation of new knowledge, from the accumulated input data that is going through the implementation phase of SWRL rules. Finally, ease of use for users is what user interfaces provide and the same for applications, this semantic data is easily obtained by the user. (Austin et al., 2017)

It is considered part of the vast Internet, which is made up of many data. Managing this data also allows dealing on a global scale, the way the Semantic Web treats the scope of data as a distributor within the scope of the World Wide Web and includes features to address the challenges of massive information or data distribution as part of its basic design.

Uniform Resource Identifier (URI)

The basis for creating the Semantic Web technologies is the Uniform Resource (URI). Every resource contains a unique URI. Assuming that different and different contents handle the same URI, this assures that it is the same resource being handled (Lee,1998). For example, a Web page address is a unique URI on the Web since no other resource can have the same web address. In Semantic Web technologies every resource has a unique URI so that it is not confused with another resource.

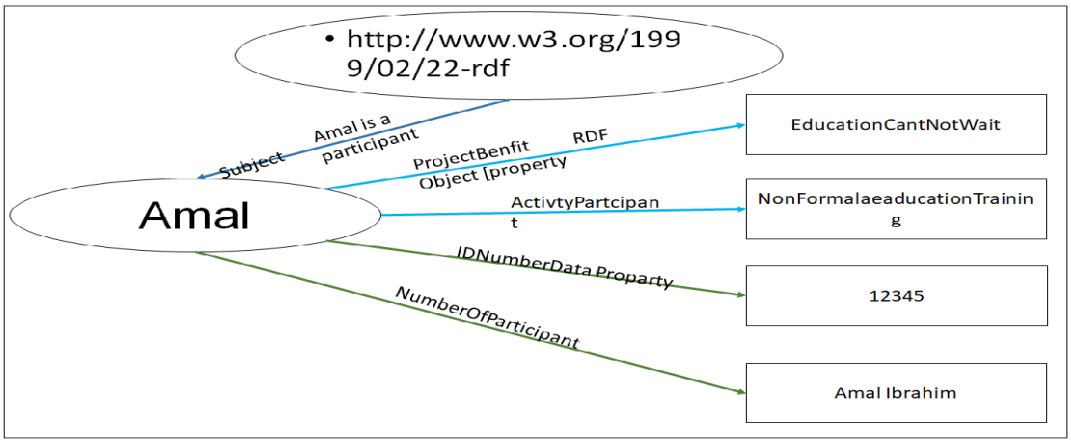
RDF

RDF is data model of Semantic Web, Whereas, RDF has three sections (subject, predicate, and object), from which the Semantic Web technologies is built. In Semantic Web technologies data can be represented as a directed graph of subject predicate and objects. RDF can be serialized in a variety of formats including RDF/XML, RDFa, JSON, RDF/XML, RDFa, and others. Generally, RDF/XML is considered for exchanging metadata between different sources.

A figure bellow sample of RDF from our ontology, one of main class is Participant Amal one of Instances, so the type of Amal is Participant, the object property assertion is projectBenfit and ActivtyParticpant.The Data Property assertions are IDNumber and NumberOfParticipant.

Figure 11*: RDF graph for Amal.*

Source: Author,2022.



What distinguishes the RDF data model type of resource, especially in graphs, is that RDF resources are always drawn as elliptical types, and all literals are drawn as squares. The namespace is specified by the RDF resource property, which indicates the relationship type between "RDF:type" property that links the type of a resource.

Since the data is formatted in a machine understandable format like RDF/XML, etc, it is easy to share the data, integrate and re-use the data for different purposes. (DECKER,2000)

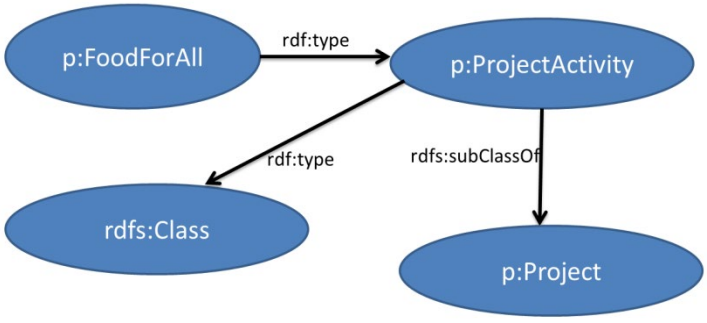
Since RDF documents do not contain any kind of schema-like information, a schema model is required. For this purpose, RDF Schema (RDFS) or OWL can be used as we describe below.
(RDF) is a framework for describing resources and for representing information in the Semantic Web. It is an abstract formula that contains two basic structures. RDF datasets are used to arrange classes of RDF graphs, and include default graphs and graphs. RDF Concepts.

RDFS

An RDFS is a vocabulary of Semantic Web (Aranda2011). The RDFs has assets restricted to RDF. The following are introduced by RDFS; rdfs:range, rdfs:domain, rdfs:Class and rdfs:subClassOf. In addition, the following annotation properties are introduced: rdfs:label, rdfs:Comment.

RDFS can save the data, and then extract this knowledge or data via a query language, SPARQL. Bellow we choose one example from our ontology. ProjectActivity is the main class, which is type of rdfs:Class. ForForAll is an instance of Project Activity. Project Activity also has a super class Project.

Figure 12: *RDFs graph.*
Source: Author,2022.



OWL

OWL is the recommended ontology language of Semantic Web descended from the logic of description. OWL provides comprehensive vocabulary for describing the semantics of a domain (Patel, 2004). OWL is much more expressive than RDFS. It contains a detailed vocabulary.

There are three types of OWL 1 that can define the two main as languages, are: OWL DL, OWL Full, and the third one is a grammatical subset is OWL Lite. OWL Full is the mots expressive version among all OWL languages but it does not guarantee computational completeness. OWL DL comes from Description Logic. It is expressive but guarantees computational completeness. OWL Lite is the least expressive among the three versions with limited cardinality constrains and less number of constructs.

SPARQL

SPARQL is the query language and query protocol of Semantic Web. SPARQL queries are like SQL queries but they are executed over RDF data. We installed our SPARQL query with some indicator we want to reach them be semantic searching, such as for monitoring and evaluation of humanitarian projects. After the ontology is created and knowledge base is populated with instances, SPARQL queries can be used for querying As sample query is given in Figure 12. SPARQL queries are executed in triples (subject predicate object). In the where clause the triple patterns are provided that will be matched with the RDF knowledge base. In addition, modifiers such as order by, filter etc can be used to order the results according to some criteria.

Figure 13: *Screen shoot of a SPARQL query for Monitoring Projects.*

Source: Author,2022

```
SELECT *
WHERE {?Projects rdf:type x:Projects;
x:PlannedProjectTarget ?ProjectTarget;
x:StartingDateOfProject ?StartDate;
x:EndingDateOfProject ?EndDtae;}
Order By ?StartDate
```

Projects	ProjectTarget	StartDate	EndDtae
ChangingHygineBehaivior	"5000"^^<http://www.w3.org/2001/XMLS	"2018-03-01T12:00:00"^^<http://www.w3	"2022-06-30T12:00:00"^^<http://www.w3
DevelopmentTheSkillsofWomen	"4000"^^<http://www.w3.org/2001/XMLS	"2018-05-28T12:00:00"^^<http://www.w3	"2020-09-09T12:00:00"^^<http://www.w3
EducationCanNotWait	"3500"^^<http://www.w3.org/2001/XMLS	"2020-12-03T10:00:00"^^<http://www.w3	"2022-12-30T14:00:00"^^<http://www.w3
FoodForAll	"7000"^^<http://www.w3.org/2001/XMLS	"2020-12-30T12:00:00"^^<http://www.w3	"2021-12-30T14:00:00"^^<http://www.w3
EmpoweringWomen	"6000"^^<http://www.w3.org/2001/XMLS	"2021-01-30T12:00:00"^^<http://www.w3	"2024-12-01T12:00:00"^^<http://www.w3

SWRL

The Semantic Web Rule Language (SWRL) is a key and important step in determining the extent of the syntactic system within a wide range of applications to perform downstream diagnostics for results, inferencing and fact-checking (Pittl, 2020).

For example, we need to infer whether the project going with evaluation plan using the following SWRL rule step-by-step as follows:

Projects(?x) ^HasProjectDepartment (?x, ?D)

Instance of Project class is represented by variable ?x. ^ refers to AND operation. And ?x must have hasProjectDepartment property value asserted into the variable ?D.

Projects(?x) ^HasProjectDepartment (?x, ?D)^ HasProjectLocation (?Odit,?L) ^

PlaningDateQuarterReportSubmit (?Odit,?QR) ^

And add the project should have location, quarter repot and submit on time.

Even we add the project should have final and middle repot and submitted on time, only with these rule the project evaluated, we should end our rule by using the right hand side using ‘->’ sign.

-> HasFileOdit (?x,? Odit)

CHAPTER V

Proposed Humanitarian Project Monitoring and Evaluation Ontology

The ontology is designed according to the main and sub-department of the projects carried out by humanitarian organizations. First, main departments of humanitarian organizations are explained. Then, details of the ontology are covered.

Main Departments of Humanitarian Organizations

Education

NGOs identified key points that efforts should be made to achieve within humanitarian organizations. Education is one of the main departments. Supporting the educational process and supporting the vulnerable to recover faster and with fewer resources, especially during disasters and wars is vital. Concerning education, UN ranks programs into three main sections (Mirghani, 2013): Formal education, non-formal education, and educational distribution tools. These tools help in developing plans and methods for education development. It is well known that many of us do not know the difference between formal education and informal education. Regular education is the one administered in public and private schools, which provides students with an education based entirely on official government curriculum. As for non-formal education, it is informal and far from government curricula. It targets different groups of people (such as children, the disabled, and adults) according to the needs of specific individuals and a specific place.

In the proposed ontology, several education-related concepts (aka classes) are created to obtain detailed data on activities related to the ways of education in humanitarian projects. The created classes capture information about trainings such as formal training, informal training, project training, learning materials, literacy, pre-exam, job skills training, etc.), which we will discuss in sub-section 5.2.

Protection

Many vulnerable people, during disasters in some countries, are exposed to violations, whether these disasters are natural or unnatural. The groups most vulnerable to these violations are women, children, the disabled and the elderly. Therefore, civil society organizations protect and support these people in those periods, from sexual abuse, intentional deprivation, physical or psychological violence

and coercion. History has shown the inability of some governments to protect their people.

As a result, the UN has called for extensive programs for vulnerable countries in periods of emergencies to try to prevent people from being abused. The program includes a protection system that includes psychological support services and social support services (PSS) in addition to support services for special case management.

In the proposed ontology, specific categories were created that are corresponding with the categories of protection services in order for us to obtain the required data in an accurate and detailed manner. These data pertain to the various protection activities in the types of humanitarian projects. For example, the Protection Training for Women and Children category covers training for women and children protection activities. (Serdan, 2009)

Case Management

The effects of bloody wars, bombing, civilian killings, cases of harassment, and assault, all of this made the case management department for psychiatric patients an important department to rehabilitate people who suffered from practices and attacks and bring them back to life again and integrate with society in a shorter time, without affecting the people who support him such as his family.

There are various activities for case managers. These activities are based on actual case management practice. The case manager is the systems coordinator and supportive companion. To address the patient's social activity. Through clinical activities such as assessment, planning, linking to existing resources, and individual discussions with the patient's family. (Derek 1996)

Consultation with psychiatrists, and most importantly, patient psychoeducation, learning the art of crisis intervention, the physical aspects of patients as well as a social environment, including housing psychotherapy, health care, benefits, transportation, families, and social networks Many cases require medication in addition to community therapy.

The case management one of the important part in humanitarian projects, but we work with on name protection.

Distribution

It is considered one of the most important sections in any project implemented by NGOs, because there are different needs that depend on time, place, and individuals. The distributions are made directly from the project, especially in the event of an emergency in wartime. There are different types according to the timing of distribution, some of which contain dry food. For example, distributions may contain rice, sugar, infant formula, oil, and others. During the time of Coronavirus pandemic, many distributions boxes contain masks as well as different types of detergents and sterilizers. On the other hand, there is a distribution for schools that have back-to-school notebook pens, and for people with special needs, there are wheelchairs. There are many NGOs that support the distribution of cash, with or without conditions, depending on the type of project or the time (Milena 2018).
In our ontology, several classes are generated to capture distribution related concepts as we discuss in the upcoming section 5.2.

Water, Sanitation and Hygiene (WASH)

Drinking water, wastewater and personal hygiene are vital to life, and any of these can be lacking in disasters, emergencies, disease outbreaks and often death. And Disasters and conflicts cause weakness in societies, and this poverty leads to people dealing with these areas by dealing with unsafe drinking water, that is, polluted water. The WASH division includes two departments; the first one is Technical Work, and the second department is Hygiene Promotion supported by Education Services. We also included these concepts in our ontology, in order to capture characteristics and activities in WASH. For example, in the most of humanitarian projects, access to safe water is the essential issue.
Hygiene promotion is an example of another concept related to WASH, which is also linked to the distribution category. For example, to keep track of elements distributed in times of urgent need, such as detergents and sterilizers (Rannveig Bremer 2012).

Technical Work

The United Nations is clear about the focus on works. The focus is primarily on standards as well as technical ability to respond in humanitarian emergencies, predictable and effective inter-agency humanitarian responses within sectors after a needs assessment and analysis to identify gaps.

Technical issues are important, as are others, and are kind of additional supports to address cross-cutting issues. Technical support for facilities and projects may include preparing training courses, implementing projects to address technical problems, providing technical assistance (World Health Organization 2007).
In the proposed humanitarian ontology, technical work related concepts are covered as well such as training activities, staff, and many more.

Hygiene Promotion (HP)

Everyone has a right to access clean water, and sanitation, which are considered important for survival in a disaster. To prevent diseases and death, access to adequate amount of water is essential. In addition, water is the main source of life (to avoid dehydration), for cooking, to use in household hygiene, and personal (Rannveig Bremer, 2012).
Reducing the transmission of diseases and oral stings is the main objective of WASH programs in humanitarian organization through promoting clean drinking water;
and follow-up of hygiene practices the right to water and sanitation is a human right for all of humanity, and this right is recognized in all international legal organizations and norms and provides for safe and accessible water, security and material at reasonable prices for various uses and sanitation facilities. Safe water is necessary to prevent death due to dehydration.
Hygiene Promotion Adequate clean water (for which there are minimum agreed standards), medical waste management, and good sanitation to dispose of personal waste and other types of waste can reduce many diseases such as diarrhea, typhoid fever, transmitted infections, and scabies. (Juliette Dautriat 2022)

Food Security & Livelihood (FSL)

FSL is the most important humanitarian services for all international and local organizations. FSL includes different types of distribution of essential food boxes that are generally easily shared at hard times in different regions. Food boxes contain different types of dry food such as baby milk and oil, rice, sugar, etc. Participants or beneficiaries directly benefit from the result of project. In the proposed ontology, the FSL categories are defined according to the characteristics and activities of livelihood projects (Ais et al., 1998b).

Health Promotion

Every day, people are exposed to many health risks after disasters. Work must be done to find preventive measures to protect human health. There must be appropriate measures to prevent the outbreak of diseases that pose a human threat. The link between security and health are two related things. Eliminating epidemics and stopping wars both reduce risks and disasters and ensure a good life for people. (Pascapurnama et al., 2018).

All type of health department they are work under name protection; in our ontology we deal with protection department.

Child and Nutrition

During the wars, most vulnerable are especially children. Recent studies indicate that wars have significant negative impact on the nutritional outcomes of children (Khatib. 2004). It is estimated that the levels of domestic violence have a significant impact on the health of newborn children as well, which reflects the current situation in areas that have been exposed to emergency risks, as the high malnutrition of children. In addition, this causes height versus age under-development due to malnutrition in children or during pregnancy. Other side effects of malnutrition are chronic diseases.

All this reflects the cumulative adverse impact on the health of future generations. Underweight, which reflects body mass for age, is considered underweight. All of this is a risk indicator, all these problems are caused by the health care of the mother and child **(**Royal 2009**).**

In our ontology this department molding on protection department in addition of the distribution department.

Emergency

Complex emergencies are humanitarian crises with high levels of violence, even it is not a war. Over two decades, with the increase in the number of wars and problems resulted in increase in the number of victims. As a result, United Nations is needed to intervene to support a well-studied emergency plan. The United Nations do their best to increasing their participation in humanitarian projects, such as community health and food. (Burkle&Eric,2003)

In our ontology deal with this department on protection and distribution department

Pregnancy

Reproductive health before, during, and after pregnancy is essential, as well as the environment (i.e. low-stress or high-conflict environment). In unplanned pregnancies due to conflict, a slight majority of these women from both groups received antenatal care during pregnancy at least once. As for realistic situations, such as in low-conflict areas, most women receive complete antenatal care. Reproductive health care for women of all ages is essential to human care. Most displaced and local women desperately need access to family planning and care services, prenatal health care, and the need for skilled birth attendants. Since the beginning of the Syrian conflict in 2011, Iraq has hosted many Syrian refugees; this number has strained the local capacity to provide the required services.

To identify the prominent health needs, restore the features of reproductive health, whether for Syrian refugees, Iraqi displaced persons, or the region's population and their use of health care services is essential (Marta, 2019).

And because it is health depart, that mean we deal with this department on protection and disruption department.

Non-communicable Diseases

Non-communicable diseases such as hypertension, diabetes, heart disease, cancer, **and** kidney and respiratory diseases are on the rise significantly and have become a significant disease burden among refugees and IDPs. Many risks and influencing factors related to the current lifestyle can be controlled. For example, physical inactivity, not eating fruits regularly as well as vegetables and replacing them with sugars and sweets, and the tendency to consume fast food instead of healthy meals that lead to high cholesterol in the blood and are one of the leading causes of cardiovascular diseases as well as cancers, in addition to weight gain, obesity and changes in metabolism All this leads to the risk. (La Revue 2004)

Vaccination

Among the causes of high mortality for many children and women, and diseases that are prevalent in second place after wars and conflicts are lack of vaccination. It has been proven that children living in areas of conflict and wars in Iraq are much more likely to be vaccinated against tuberculosis, measles, and polio than Children living in low-conflict war zones. Statistics have proven that the conflict

is detrimental to public health, which is why the extensive presence of international aid has been for organizations specialized in WHO Organization, in this field in conflict areas.

Vaccination has been consistently cited as the most critical public health to control diseases and reduce the number of infections. Vaccination reduces child deaths and the number of handicaps, such as polio, as an example. The private sector invests significant sums in producing various types of vaccines and research. However, the list of diseases that vaccines can prevent is increasing; according to the 2020 report issued by the World Health Organization WHO (who,2006) most children living in Iraq receive the recommended vaccinations. In addition, of course, these vaccines save at least two million babies and mothers every year, and it is clear that the number of related deaths has been declining in recent years (World Health Organization 2007).

Classes of the Proposed Ontology

Implementation of many different types of humanitarian projects by humanitarian organizations operating in areas such as Yemen, Syria and Iraq with different types of projects: Education and Livelihoods (FSL), Water, Hygiene, Protection and Sanitation (WASH) and Food Security. Separate classes are created under these categories in the proposed ontology using Protégé Ontology editor (Hendler et al., 2009) Below, we will illustrate

- Main Classes.
- Object properties.
- Data type properties.
- Sample of individuals.

Main Classes

The Table 1 shows our main classes. First, the class name is given, then it description is provided. We created the main classes to cover main concepts in our humanitarian ontology and connected them with our main humanitarian projects implementation departments. In this way, humanitarian projects and different activities can be linked to each other semantically. There are two important departments where the main activities are: Staff and Participant. We had to connect them together with project activities, Departments, Project Location and other

concepts. In this way, we can monitor and evaluate humanitarian projects automatically which is the main aim of this work. Onto Graph representation of the main classes are also demonstrated in Figure 15.

Figure 14*: Onto Graf representation of main classes.*
Source: Author,2022

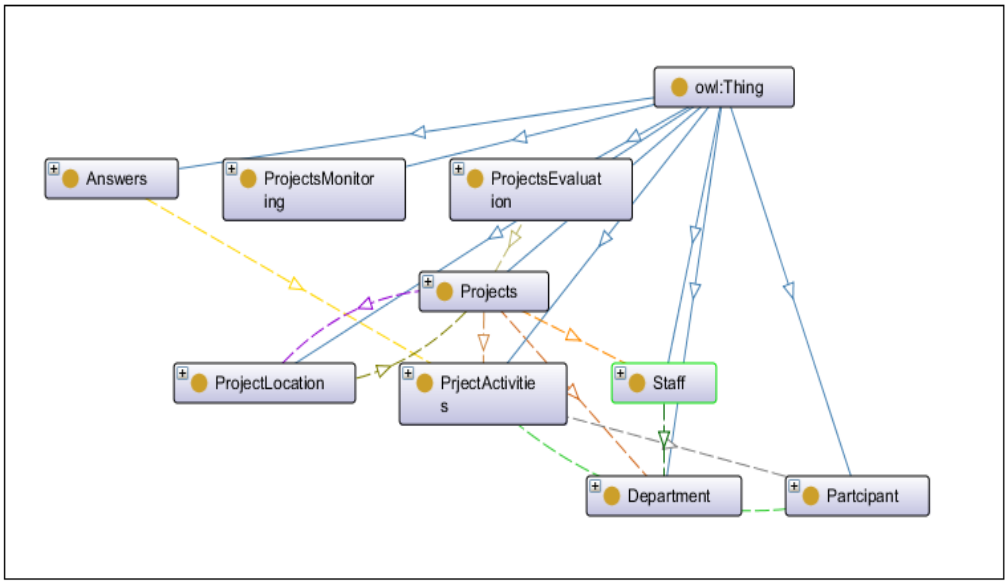
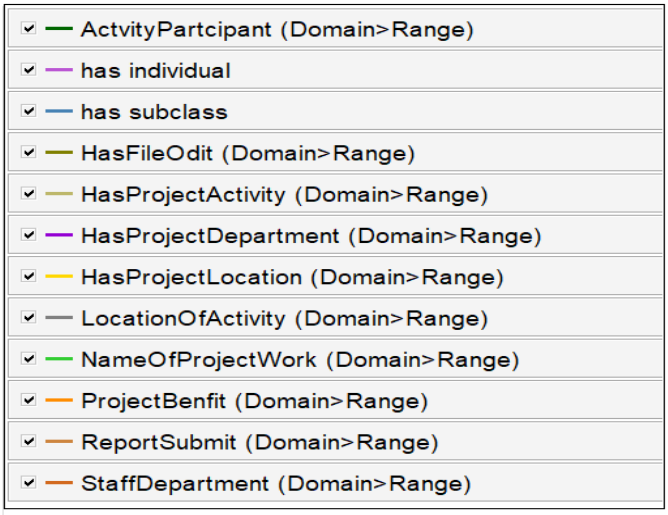


Figure 15: *Onto Graf meaning of all colors*.
Source: Author,2022.



Project Activities class also contains sub-classes as shown in Figure 11; Assessment Activities, Distribution Activities, Session Activities and Training Activities.

Figure 16*: Classes, sub-classes of the ontology*

Source: Author,2022

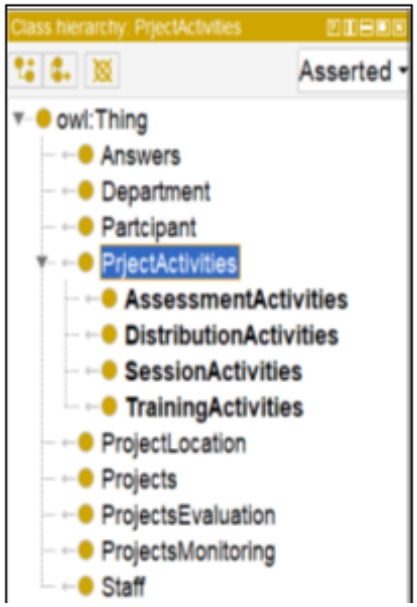


Table 1: Ontology classes main classes of the ontology.

Source: Author,2022.

Class	Description
Answers	True and False, we need these two answers in our SPARQL and Rule
Department	The Humanitarian department; like Education ,FSL, Health, Protection and Wash
Participants	The people (Refugees, IDPs) benefit from the Project**.**
Project Activity	The set of activities carried out by the organization through the Project to reach their goals\
Project Location	Here we deal with three cities Anbar, Bagdad, Duhok, Musel.
Projects	Any project applied by NGO or INGO.
Project Evaluation	It is the process of honest and objective evaluation of a project, whether it is ongoing or completed.
Project Monitoring	The process of closely monitoring the project management lifecycle from inception to completion of the entire Project and ensuring that all project activities are on track.

An Object property of the ontology.

Several object properties are created to link the instances of the project, project activities, participants and staff to each other.

The object property type of information identity to do and the data property is it type of information too but gave more details like time date, duration, Domain specific constraints are generally known as a method for acquiring these data.

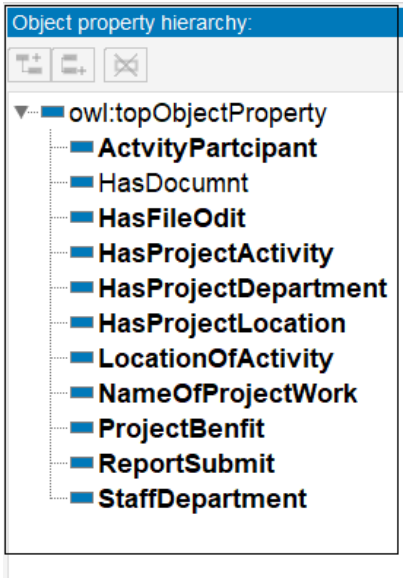
Table 2*:Object Property*

Source: Author, 2022.

Has File Oddity	Domain	Range	Aim
Has Project Activity	Project Activity	Participant	Registration all activities like Assessment, Distribution, and Session for the participants.
Has Project Department	Answers	Projects	Mean this file has been checked before going to project.
Has Project Location	Projects	Project Activity	Clear the type of the service or activity.
Location Of Activity	Projects	Department	Every project should has diffracts department like education, FSL, Protection, and WASH.
Name Of Project Work	Projects	Project Location	Identity the place of the project has been implement .
Project Benefit	Project Location	Projects	Identity the place of the activity has implement .
Report Submit	Projects	Staff	Identity the project ‘s name specific what time of activity the participant benefit from the project..
Staff Department	Project Activity	Participant	
Projects	Project Evaluation	Projects	Identity the type of the report that been Submit.

The figure bellow shows a screenshot of the Object Properties list, in our ontology. Here with the object property, we have activated more than ten object properties. First, we choose the properties that suit our project, and then we choose Domain and Range to each.

Figure 17: Object Property.
Source: Author, 2022.



The figure bellow is contain the OWL of Object property (ActiveParticipant) the Project Activty and the Participant are class,But it is clear that the Participant is Range and Project Activty is Domain.

Figure 18: OWL one of Object property of the ontology.
Source: Author,2022

```
<owl:ObjectProperty rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActvityPartcipant">
        <rdfs:domain rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
        <rdfs:range rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant"/>
</owl:ObjectProperty>
```

Data type properties of the ontology

The Table 3 shows data properties we added to the ontology in ontology we deal with object and data properties we thought they had the same future especially since they both deal with information but they are too different the

Object properties connect the two subjects (subject and object) with the predicate, but the data properties, connect only one subject data, although it contains a specific type of data (string, integer, date, Date Time, etc.) The date of receiving the reports, as it is important for the evaluation department. In this way, we can know which people are more committed to delivering the report, whether monthly or final, as well as the information of employees or participants. Are they well documented, such as names and personal ID numbers? In addition, many details such as the number of participants in a project and the date of the participation benefit from the project activity are data properties.

Here shows the OWL of the Data property as we know, the data property deal with one subject data like (string, integer, date, Date Time, etc.) in this figure sample, the quarter Report Submit is the Data property, and the Project Evaluation is the class, so the range for the data property is Date time.

Table 3: *Data Property of the Ontology*

Source: Author,2022.

Actual Date Quarter Report	Domains	Ranges	Aim
Actual Final Report Submit Date	Projects Evaluation	Date Time	The Date of Quarter Report Submit.
Actual Middle Report Submit Date	Projects Evaluation	Date Time	The Date of Final Report Submit.
Actual Project Target	Projects Evaluation	Date Time	The Date of Middle Report Submit.
Date Of Benefit	participant	String	The number of Target reached
Duration Of Activity	Participant	Date Time	The date of every activity.

Email	Project Activity	Date Time	Some Activity has duration for one year or months
Ending Date Of Project	Staff	String	Its type of document, email and mob for staff documentation.
ID Number	Projects	Date Time	The date of last steps of project.
Name	Participant	String	Its type of documentation
Name Beneficiary	Staff	String	Insert the full name.
Number Of Participant	Participant	String	List name of Participant.
Planning Date Quarter Report Submit	Project Activity	Integer	Identity the number of Participant for every project or activity.
Planned Project Target	Project Activity	Integer	The date that sign the donor and the NGO to submit the quarter report.
Planning Final Report Submit Date	Projects	Integer	Confirm the service of evaluation in CB service.
Planning Middle Report Submit Date	Project Evaluation	Date Time	Final evaluation report officially, sign the donor and the NGO to submit.
Position	Project Evaluation	Date Time	Middle evaluation report officially submit.
Staff Date Of Join	Project Evaluation	Date Time	Document the position of the Staff
Starting Date Of Project	Staff	Date Time	Conform of the first date of starting day for staff

Figure 19*: The OWL data property.*

Source: Author,2022.

```
<owl:DatatypeProperty rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualDateQuarterReportSubmit">
    <rdfs:domain rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
</owl:DatatypeProperty>
```

Figure 20: *Data Property.*

Source: Author,2022.

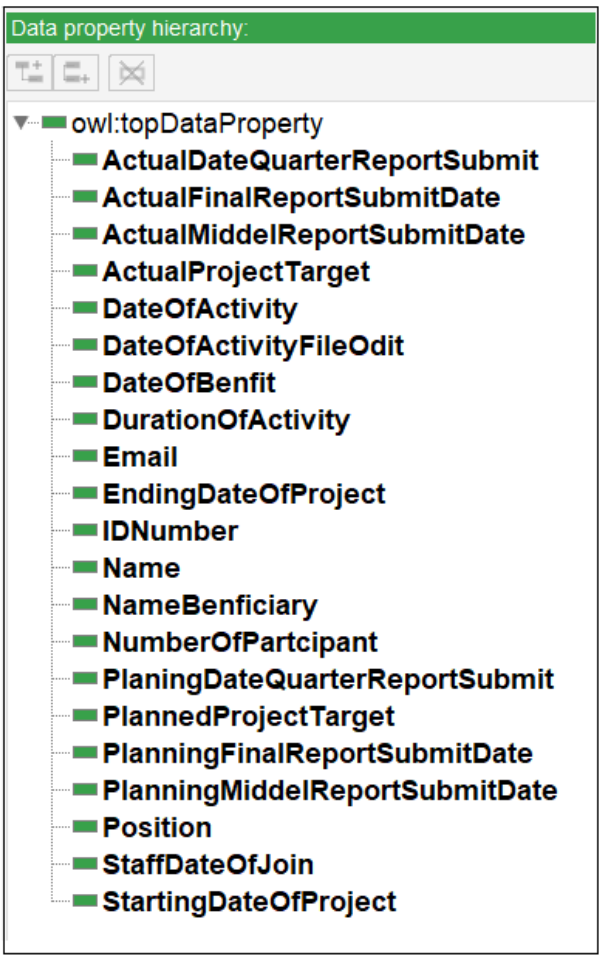
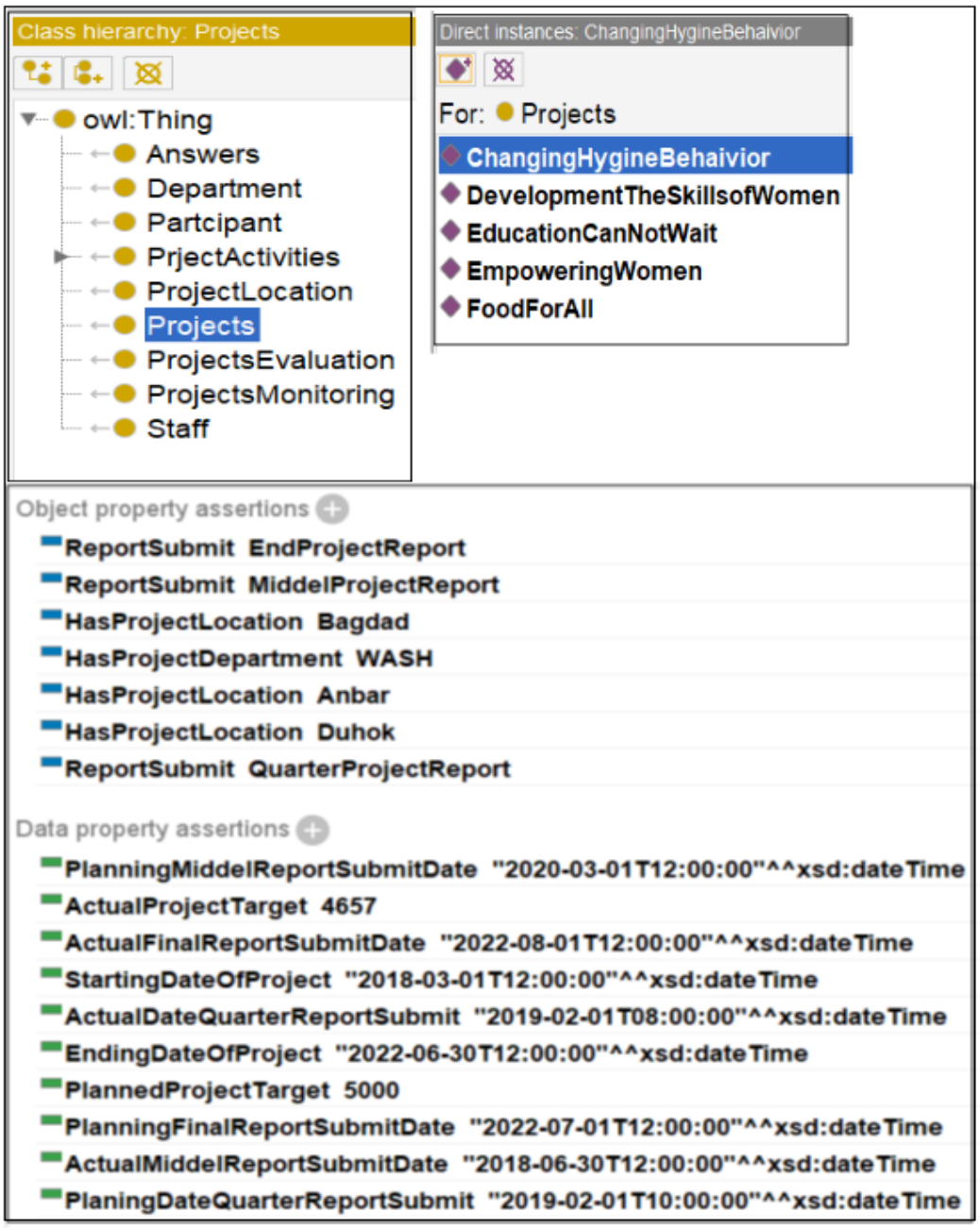


Figure 19 is show sample of data property and range, domain. We choose the Date Time as a Range to add the date and time for submit the Quarter Report.

Figure 21: *Classes and Individuals, Object, Data Property*

Source: Author,2022.



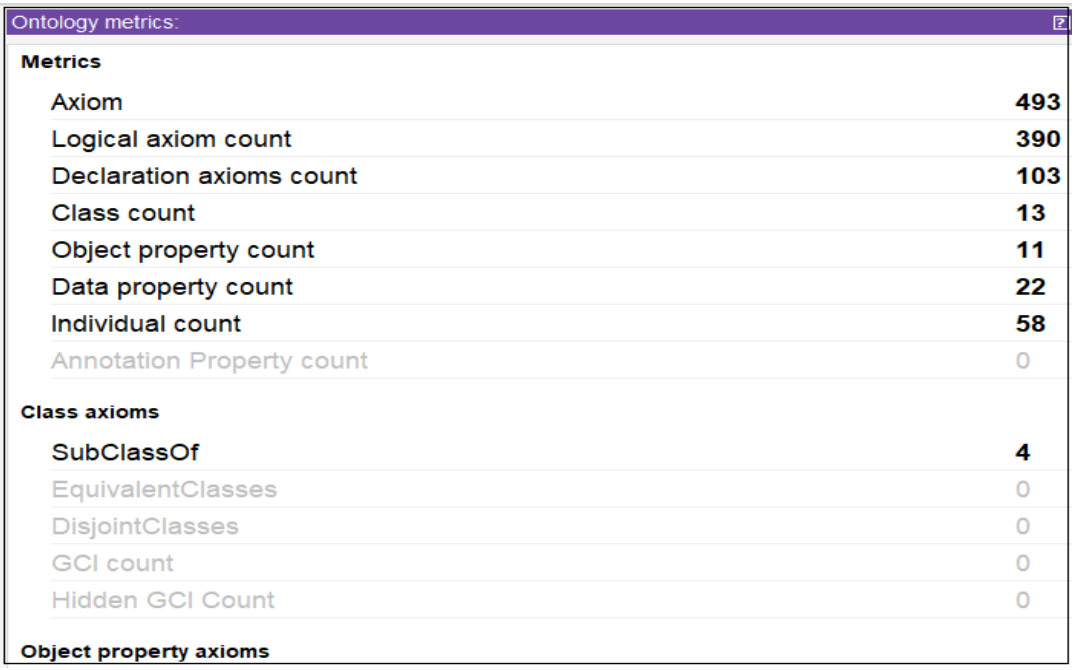
Populating the Ontology with Instances

with humanitarian projects data, we add our project's information, then we prepare the plan of our ontology, then we installed it and arrange the data with the instance, the object with data property.

cause I'm a main Co-founder to Bishkoreen organization, it is a local NGOs in Iraq, and my post is Monitor and Evaluation Manger, that gave me free to deal with data, what i need in my thesis.

Figure 22: *instances of different classes are illustrated.*

Source: Author, 2022



This figure shows the number of object and data property, class and sub class.

Figure 23:*Instances of different classes*

Source: Author, 2022

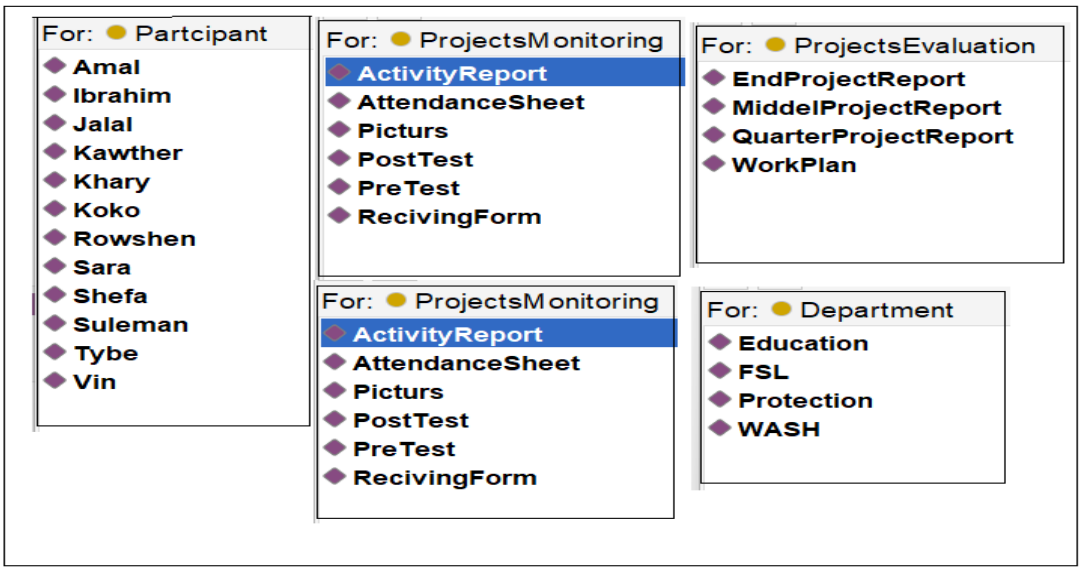


Figure 24: *Project Class Instances*

Source: Author,2022

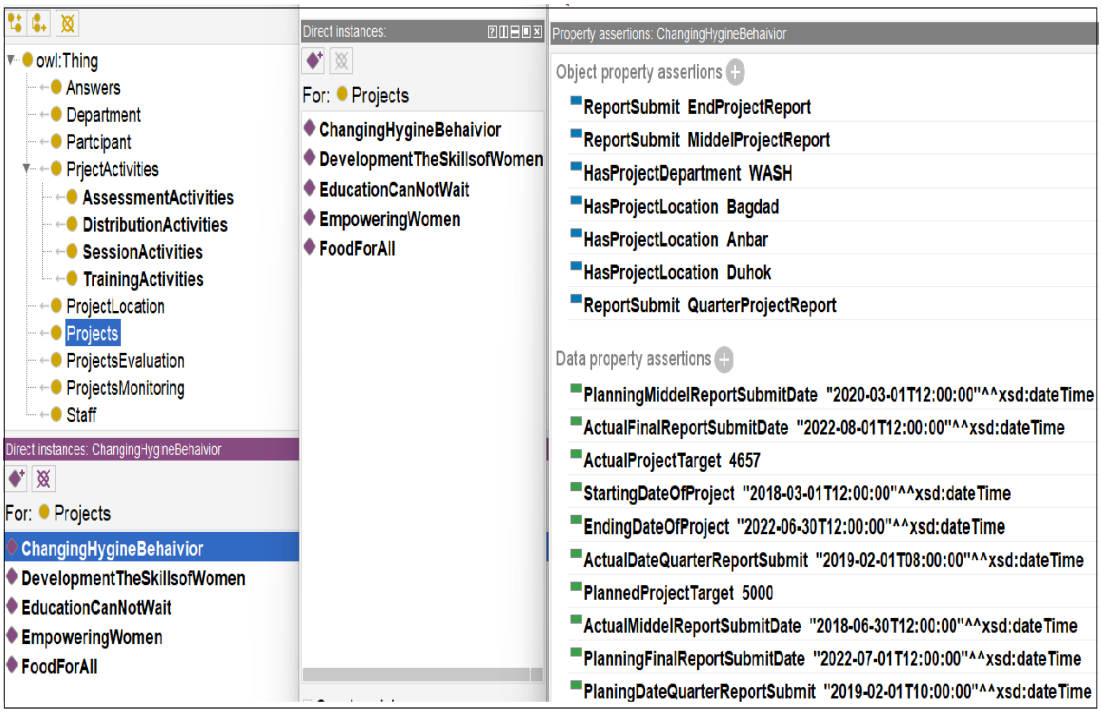


Figure 25: *RDF/XML of one of instance.*

Source: Author,2022

In Figure 24, RDF/XML representation of a Project Instance called “FoodForAll” is shown. As it is seen different object properties and data properties are linked to this instance. For example, it contains quarter project, middle project and end project reports. Start and end times of the project and planned target groups are also outlined. Once the data is a machine-process able format, then it is possible to share it or query using complex SPARQL queries, which is explained in the next chapter. The full RDF/XML version of the propose ontology is given in the Appendix.

CHAPTER VI

Querying The Proposed Ontology Using SPARQL

In this chapter, we discuss the developed SPARQL queries that have been implemented by to query the created metadata by the proposed ontology. SPARQL is a type of query language and a query protocol. This language has its own **advantage,** which is the ability to write global queries over RDF data. Using the Protégé SPARQL tab, we have established queries over the created ontology and knowledge base.

Table 4 demonstrates SPARQL queries we wrote to read our goal of monitoring and evaluation of humanitarian projects. Our goal is: monitoring the staff, Projects, Activities, like count number of staff, monitoring the document (names, email, ID, Training), and evaluation the projects, which one reach the target planned, the location of the activity) all this information we needed to compare them and to have good project evaluation.

From the first example above we will:

- Prefix declarations: show the URI, we interduse the RDF, OWL, RDFs, XSD, and final the X: -

  PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
  PREFIX owl: <http://www.w3.org/2002/07/owl#>
  PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
  PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
  PREFIX
  x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#>

- Dataset definition: stating what RDF graph(s) is being queried.
  In the example it is not shown which is start by from and show the RDF start point.

- A result clause: the information which should be return

  SELECT StaffName ?Position ?Email ?StaffDepartment ?StaffDateOfJoin

- The query pattern: show the information that in need to be query.

  WHERE {?Staff rdf:type x:Staff;
  x:Name ?StaffName;

x:Position ?Position;
x:StaffDepartment ?StaffDepartment;
x:StaffDateOfJoin ?StaffDateOfJoin ;
x:Email ?Email;}

Now the result by query will know all name of staff that have ID, Name register, Position, and email.

Table 4: ***SPARQL***

Source: Author,2022

Question	**SPARQL**
Monitoring staff	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT ?StaffName ?Position ?Email ?StaffDepartment ?StaffDateOfJoin WHERE {?Staff rdf:type x:Staff; x:Name ?StaffName; x:Position ?Position; x:StaffDepartment ?StaffDepartment; x:StaffDateOfJoin ?StaffDateOfJoin ;x:Email ?Email;}
Monitoring project location n	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?Projects rdf:type x:Projects; x:HasProjectLocation ?Location;} Order by ?Location
Monitoring the Project documentation	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?Projects rdf:type x:Projects; x:PlannedProjectTarget ?ProjectTarget; x:StartingDateOfProject ?StartDate;

x:EndingDateOfProject ?EndDtae;}
Order By ?StartDate

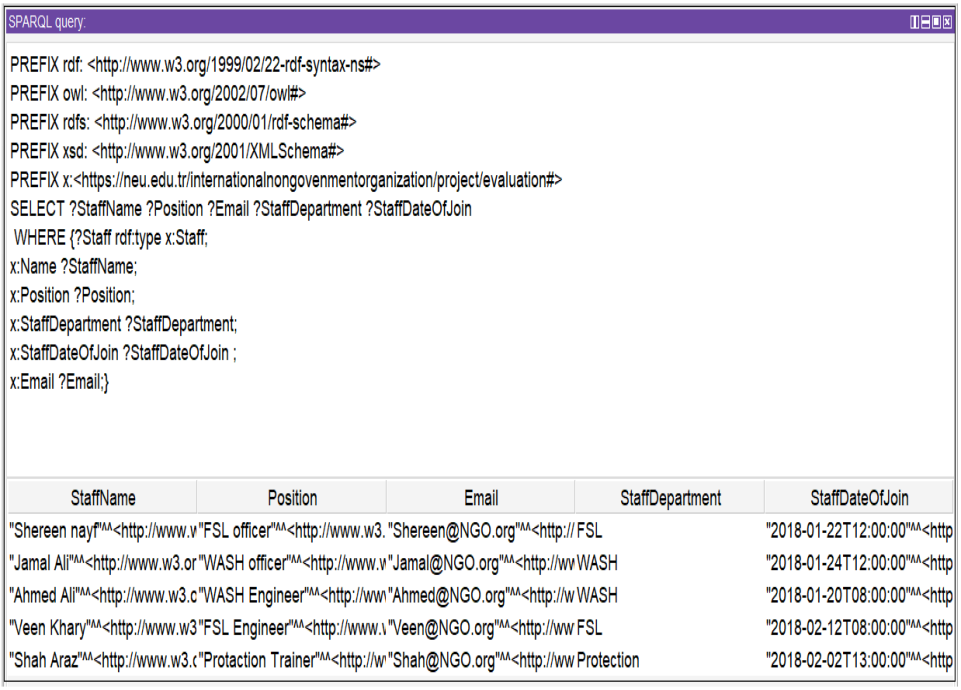
Count staff number	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT (COUNT(?Staff) AS ?count) WHERE {?Staff rdf:type x:Staff.}
Monitoring project target	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?Projects rdf:type x:Projects; x:PlannedProjectTarget ?PlannedTarget; x:ActualProjectTarget ?ActualTarget.}
Evaluation the project	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?Projects rdf:type x:Projects; x:ActualDateQuarterReportSubmit ?ActualDateQuarterReportSubmit; x:PlaningDateQuarterReportSubmit ?PlaningDateQuarterReportSubmit; x:PlanningMiddelReportSubmitDate ?PlanningMiddelReportSubmitDate; x:ActualMiddelReportSubmitDate ?ActualMiddelReportSubmitDate; x:PlanningFinalReportSubmitDate ?ActualFinalReportSubmitDate.}
Monitoring Training	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?TrainingActivities rdf:type x:TrainingActivities; x:DateOfActivity ?DateOfActivity; x:DurationOfActivity ?DurationOfActivity; x:NumberOfPartcipant ?NumberOfPartcipant.}

Monitoring Training for number of participant equal and up 180 person	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?TrainingActivities rdf:type x:TrainingActivities; x:DateOfActivity ?DateOfActivity; x:DurationOfActivity ?DurationOfActivity; x:NumberOfPartcipant ?NumberOfPartcipant. filter(?NumberOfPartcipant>=180).}
Monitoring training list all project training	PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#> SELECT * WHERE {?Training rdf:type x:TrainingActivities; x:HasProjectActivity ?Project.}

The figures bellow shows some SPARQL queries that are implemented in Protégé ontology editor to demonstrate monitoring and evaluation of humanitarian projects through detailed SPARQL queries.

Figure 26: *Monitoring staff.*

Source: Author,2022



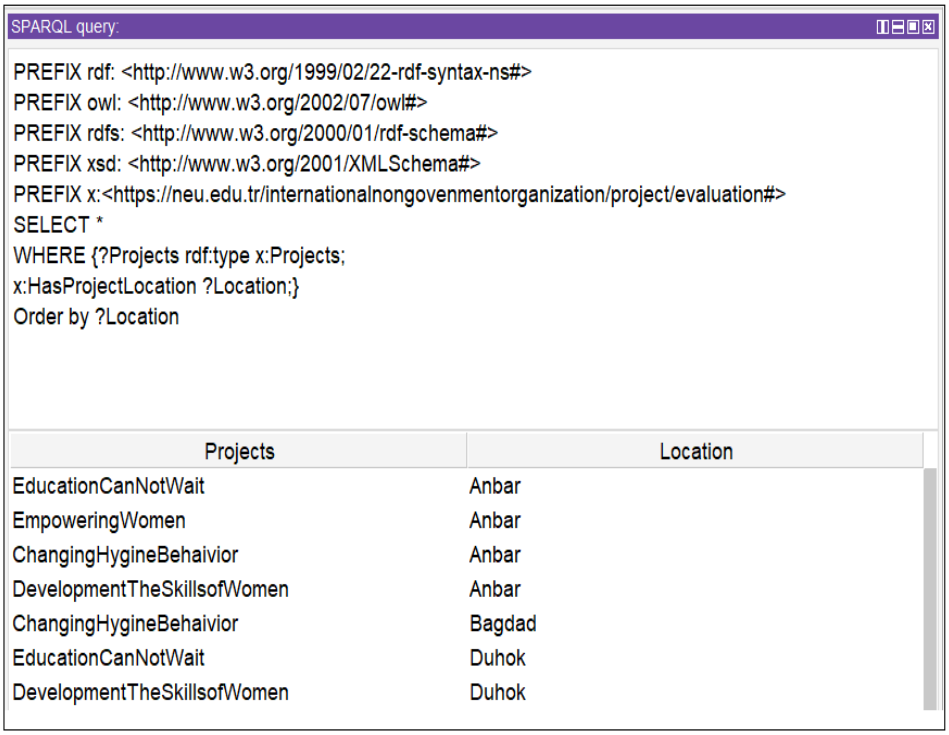
SPARQL query:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#>
SELECT ?StaffName ?Position ?Email ?StaffDepartment ?StaffDateOfJoin
 WHERE {?Staff rdf:type x:Staff;
x:Name ?StaffName;
x:Position ?Position;
x:StaffDepartment ?StaffDepartment;
x:StaffDateOfJoin ?StaffDateOfJoin ;
x:Email ?Email;}
```

StaffName	Position	Email	StaffDepartment	StaffDateOfJoin
"Shereen nayf"^^<http://www.v	"FSL officer"^^<http://www.w3.	"Shereen@NGO.org"^^<http://	FSL	"2018-01-22T12:00:00"^^<http
"Jamal Ali"^^<http://www.w3.or	"WASH officer"^^<http://www.v	"Jamal@NGO.org"^^<http://ww	WASH	"2018-01-24T12:00:00"^^<http
"Ahmed Ali"^^<http://www.w3.c	"WASH Engineer"^^<http://ww	"Ahmed@NGO.org"^^<http://w	WASH	"2018-01-20T08:00:00"^^<http
"Veen Khary"^^<http://www.w3	"FSL Engineer"^^<http://www.v	"Veen@NGO.org"^^<http://ww	FSL	"2018-02-12T08:00:00"^^<http
"Shah Araz"^^<http://www.w3.c	"Protaction Trainer"^^<http://w	"Shah@NGO.org"^^<http://ww	Protection	"2018-02-02T13:00:00"^^<http

Figure 27: *Monitoring project location*.

Source: Author,2022



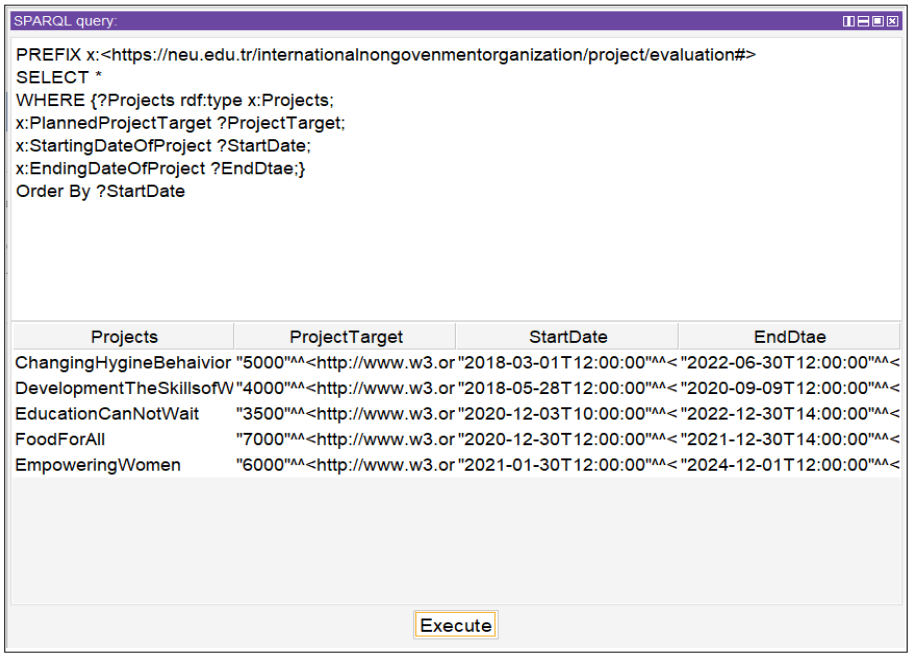
SPARQL query:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX x:<https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#>
SELECT *
WHERE {?Projects rdf:type x:Projects;
x:HasProjectLocation ?Location;}
Order by ?Location
```

Projects	Location
EducationCanNotWait	Anbar
EmpoweringWomen	Anbar
ChangingHygineBehaivior	Anbar
DevelopmentTheSkillsofWomen	Anbar
ChangingHygineBehaivior	Bagdad
EducationCanNotWait	Duhok
DevelopmentTheSkillsofWomen	Duhok

Figure 28: Monitoring the Project documentation.

Source: Author,2022



In Figure 28, we can count all staff or participant for one project or more, in one location or more.

Figure 29: *Count Staff Number*.

Source: Author,2022

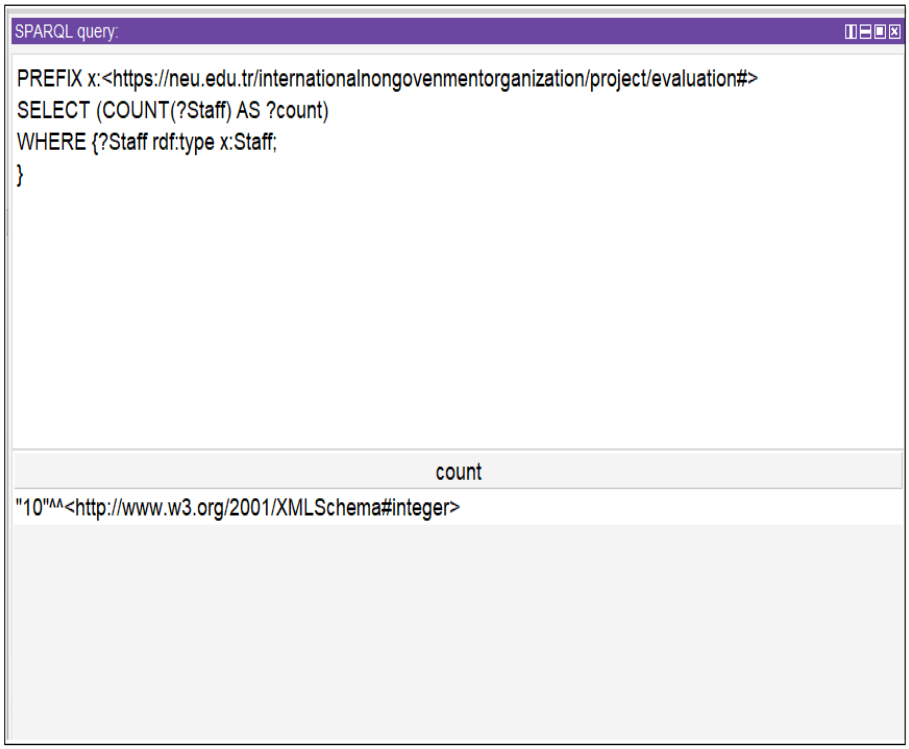


Figure 30: *Monitoring Projects Target.*

Source: Author,2022.

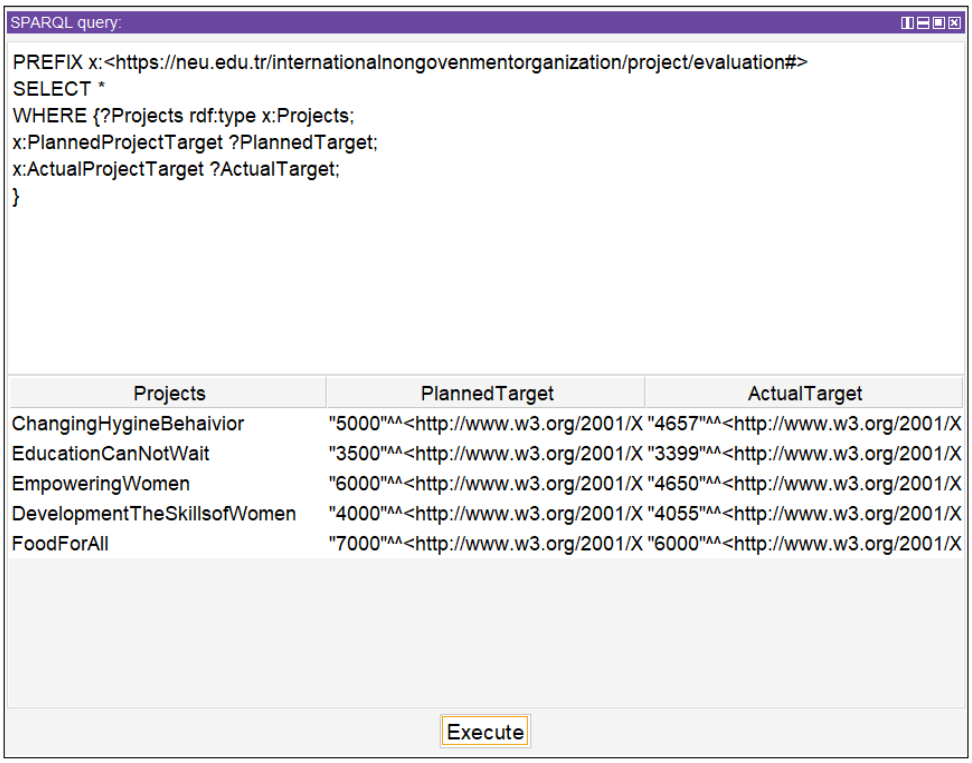


Figure 31: *Evaluating The Project.*

Source: Author,2022

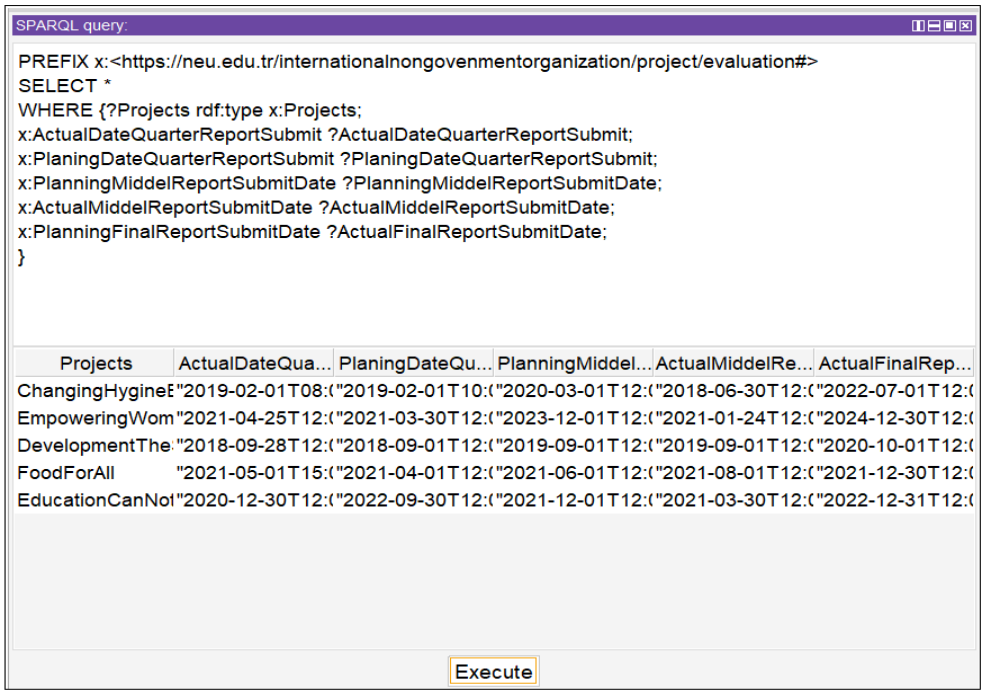
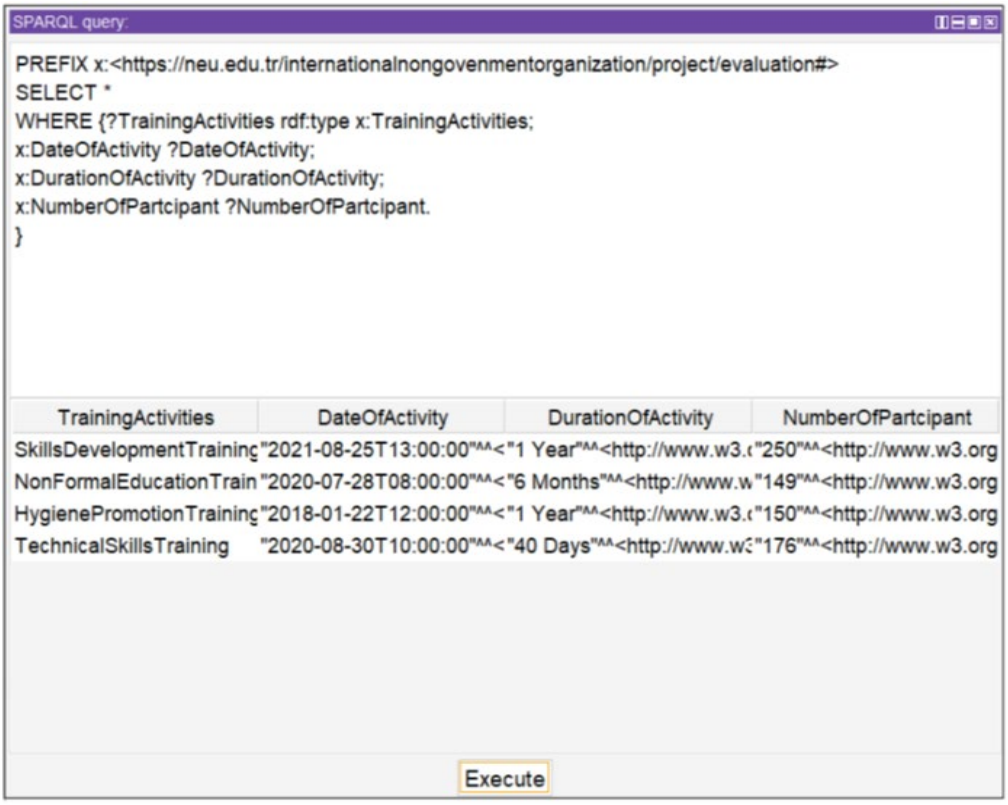


Figure 32: *Monitoring Training.*

Source: Author,2022.



CHAPTER VII

SWRL Rules for Querying and Reasoning

SWRL rules that can be implemented to gain new knowledge about the monitoring and evaluation of the activities of these humanitarian projects. Using the Protégé SWRL tab, we have established rules for our SWRL project based on project activities. We have included some examples of these SWRL rules shown in Table table 5 to this page.

By using these SWRL rules, it is possible to know how accurately the activities are being performed, the extent to which the participants benefited from these projects in addition to the activities of employees and other related knowledge automatically.

Bellow we explain the steps of all rules that we installed;

Table 5: *Rules*

Source: Author,2022

Inference	SWRL Rules
Infer whether the participants have been officially registered in any activities of the women's empowerment project, for example	Partcipant(?x) ^ ProjectBenfit (?x,? Benfit) ^ DateOfBenfit (?x,?DB) ^ IDNumber (?x,?ID) ^ NameBenficiary (?x,?NB) -> ActvityPartcipant (?x,True)
Infer whether the project have been benefited from his activities	Projects (?x)^ HasProjectActivity(?x,?Activity)^HasProjectDepartment(?x,?HD) ^HasProjectLocation (?x,? Location) ^NameOfProjectWork (?x,? NW)-> ProjectBenfit (?x,True)
Infer whether the project going with evaluation plane	Projects(?x) ^ HasProjectDepartment (?x, ?D) HasProjectLocation (?Odit,?L) ^ PlaningDateQuarterReportSubmit (?Odit,?QR) ^ PlanningFinalReportSubmitDate (?Odit,?FR) ^

	PlanningMiddelReportSubmitDate(?Odit,?MR) ^ -> HasFileOdit (?x,? Odit)
Infer whether project activities going with monitoring plane	PrjectActivities (?x) ^ DateOfActivity (?x, ?DA) ProjectBenfit (?PA,?Benfit) ^ DateOfActivityFileOdit (?PA,?Odit) ^ DurationOfActivity (?PA,?Activty) ^ NumberOfPartcipant (?PA,?Particpant) ^ -> HasProjectActivity (?x,? PA)
Infer whether the project Target with monitoring plane	Projects(?x) ^ StartingDateOfProject (?x, ?SP) PlannedProjectTarget (?HPt,?PT) ^ ActualProjectTarget (?HP,?AT) ^ EndingDateOfProject (?HP,?EP) ^ -> HasProject (?x,?HP)
Infer whether the project personnel recording with the control level	Staff (?x) ^ NameOfProjectWork (?x,? NP) ^ StaffDateOfJoin (?x,?DJ) ^ Position (?x,?P) ^ Name (?x,?N) -> StaffDepartment (?x,True)

Rule 1

In this rule, we need to have a proof whether the participants have been officially registered in any activity. First we identity the instances of the Participant class and represent it by Particiant(?x), we attributes of the participant instances are checked using the representation of (?x,?--), since ?x variable represents the participant instance now. For example, participant must have a ProjectBenefit relationship, DataofBenefit, IDNumber, etc. AND operation is represented by ^ symbol. This is the left hand side of the rule.

Partcipant(?x) ^ ProjectBenfit (?x,? Benfit) ^ DateOfBenfit (?x,?DB) ^ IDNumber (?x,?ID) ^

NameBenficiary (?x,?NB) ->ActvityPartcipant (?x,True)

If the left side of the rule satisfies, then right-hand side of the rule fired. In other words if all these futures are correct for the participant (ProjectBenfit, DateOfBenfit, IDNumber, NameBenficiary), it means that the project activity is true, and the following assertion to the metadata will be added ->ActvityPartcipant (?x,True).

Rule 2

Rule two we want to proof the Infer whether the project have been benefited from the activities, is that true or not.

We select the project class for first step, on right hand side, represent the project by (?x)

And represent the futures by (?x, ?-) and connect them with each other by ^ sign.

Projects (?x) ^ HasProjectActivity (?x,? Activity) ^ HasProjectDepartment (?x,? Department) ^ HasProjectLocation (?x,? Location) ^ NameOfProjectWork (?x,? Name) **->**ProjectBenfit (?x,True).

If these conditions satisfy then the right hand side will fire with -> sign to proof if the project was benefited should have answer True. **->**ProjectBenfit (?x,True).

Rule 3

In this rule, we need to infer whether the project going with the evaluation plan. We select the project class and represent it by(?x). Then, we add check all attributes (object and data property) to satisfy these conditions with (?x,?--) , we add them to gather by AND ^ sign.

Projects(?x) ^ HasProjectDepartment (?x, ?D) HasProjectLocation (?Odit,?L) ^ PlaningDateQuarterReportSubmit (?Odit,?QR) ^ PlanningFinalReportSubmitDate (?Odit,?FR) ^ PlanningMiddelReportSubmitDate(?Odit,?MR) -> HasFileOdit (?x,? Odit).

The right hand side is the proof step, if the project covers all futures that mention before, it means that the project is evaluated or audit it. We start with -> and add what we want to proof; -> HasFileOdit (?x,? Odit).

Rule 4

Rule four we need to proof: infer whether project activities going with the monitoring plane,

Start the left side by select the project activity class, represent it by(?x),(PrjectActivities (?x)) Then, we add check all attributes (object and data property) to satisfy these conditions by AND ^, and represent them by (?x,?--),

DateOfActivity (?x, ?DA)^ProjectBenfit (?PA,?Benfit) ^DateOfActivityFileOdit (?PA,?Odit) ^ DurationOfActivity (?PA,?Activty) ^NumberOfPartcipant (?PA,?Particpant) ^

We need to proof if the project has (DateOfActivity, ProjectBenfit, DateOfActivityFileOdit, DurationOfActivity, NumberOfPartcipant) project covers all futures that mention before, it means that mean the project has project activity with If these conditions satisfy then the right hand side will fire So on right side we will insert: -> HasProjectActivity (?x,? PA).

Rule 5

Rule five we need to proof infer whether the project Target with monitoring plane,

We start with wright projects word and represent it by (?x) Then, we add check all attributes (object and data property) by AND sign ^ to satisfy these conditions with (?x,?--).

Projects(?x) ^StartingDateOfProject (?x, ?SP)^PlannedProjectTarget (?HPt,?PT) ^ActualProjectTarget (?HP,?AT) ^ EndingDateOfProject (?HP,?EP) .

The right hand side we add the -> sign and add the last future that we need to proof it,so if the project have all futures that we mention before now(StartingDateOfProject, PlannedProjectTarget, ActualProjectTarget, EndingDateOfProjec) that mean the If these conditions satisfy then the right hand side will fire .

So we add this sign -> and add the last future that we need to proof it. HasProject (?x,?HP)

Rule 6

In last rule we need to proof infer whether the project personnel recording with the control level, we select the staff class, represent it by (?x) connected with futures by ^ sign, select futures(object and data property) represent them by(?x,?--) and connect them together byANND sign ^ sign Staff (?x) ^ NameOfProjectWork Then, we add check all attributes (?x,? NP) ^ StaffDateOfJoin (?x,?DJ) ^ Position (?x,?P) ^Name) to satisfy these conditions (?x,?N)

For the right hand side, this side to choose what we need to a proof, If these conditions satisfy then the right hand side will fire with -> sign and add the future we need to a proof.

->StaffDepartment (?x,True).

In Figures bellow, the implemented rules are shown in the Protégé interface.

Figure 33: *inferred axioms based on a SWRL rules from Protégé instances for two rules*

Source: Author,2022

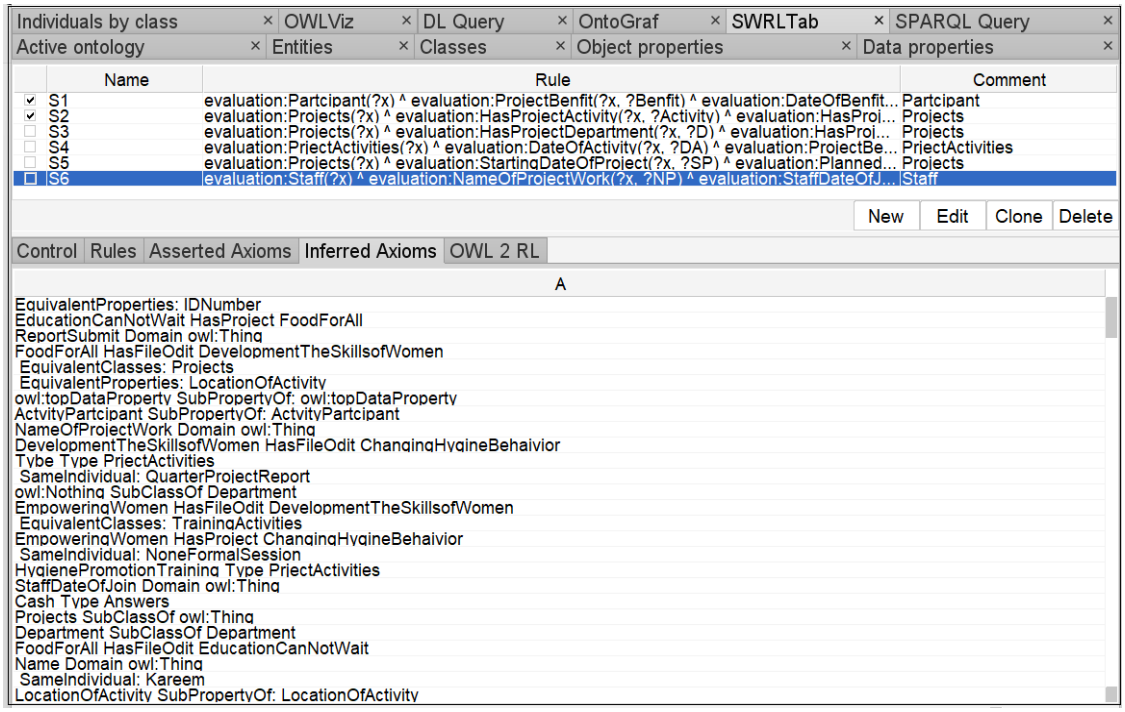


Figure 34: *inferred axioms based on a SWRL rules from Protégé instances for all rules.*

Source: Author,2022

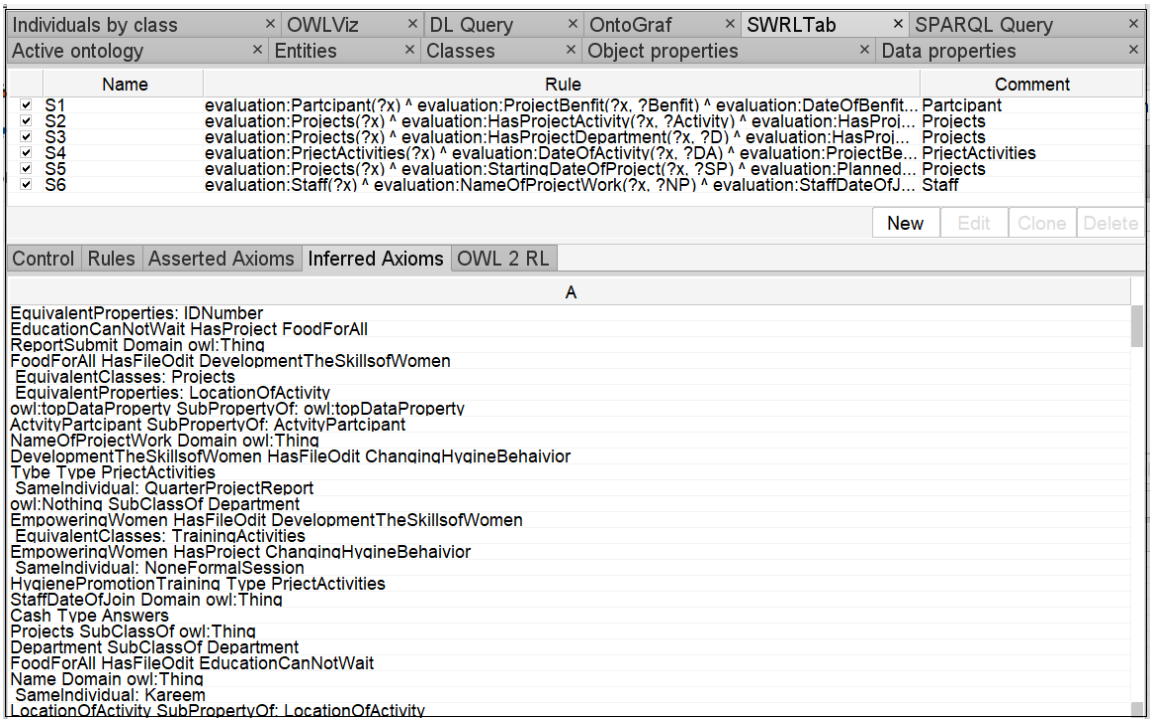


Figure 35: *SWRL Control*.

Source: Author,2022

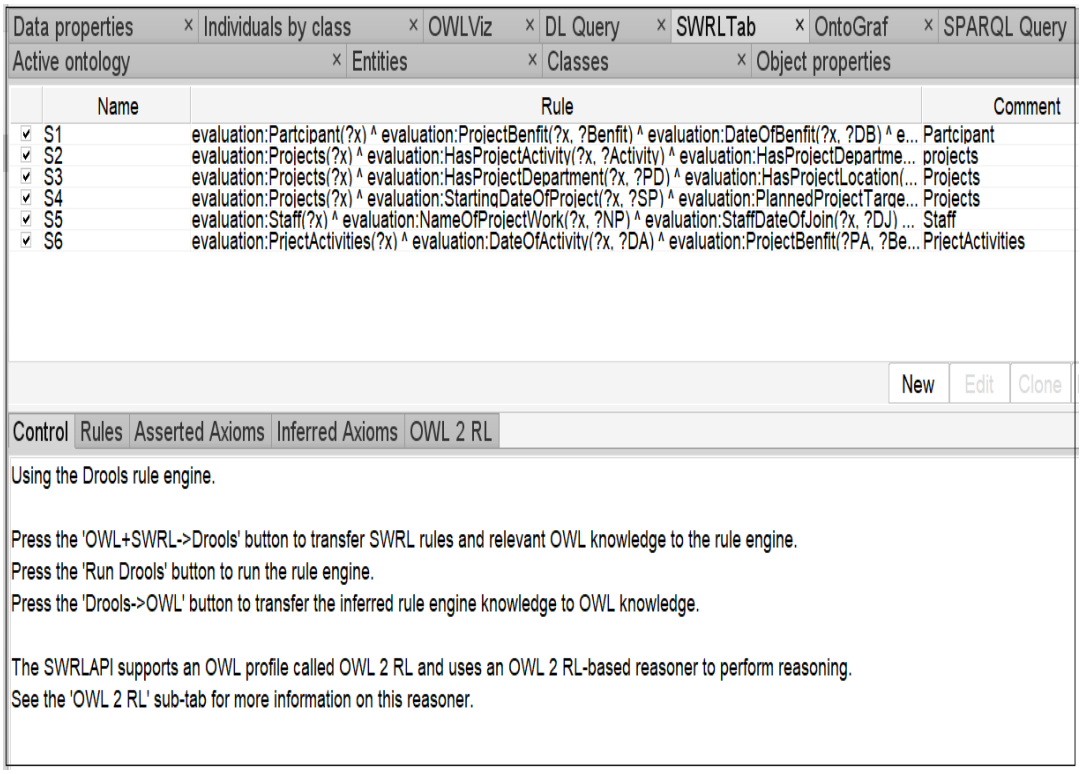


Figure 36: *All SWRL Rule*.

Source: Author,2022.

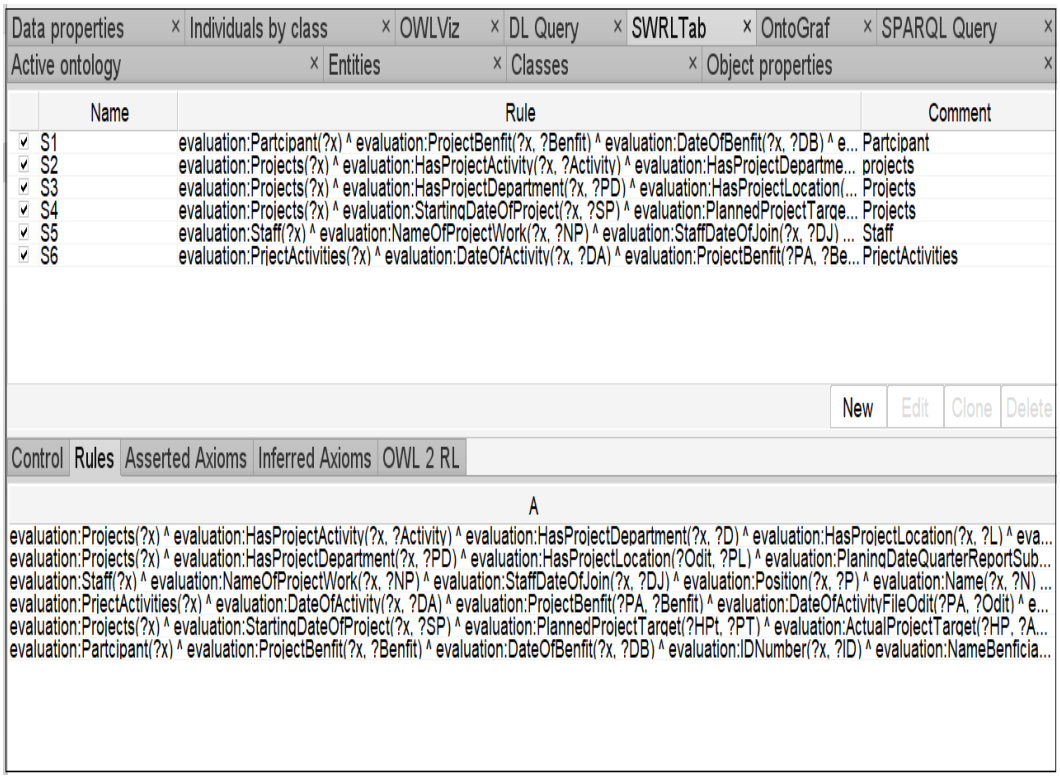


Figure 37:*Asserted Axioms Rule.*

Source: Author,2022.

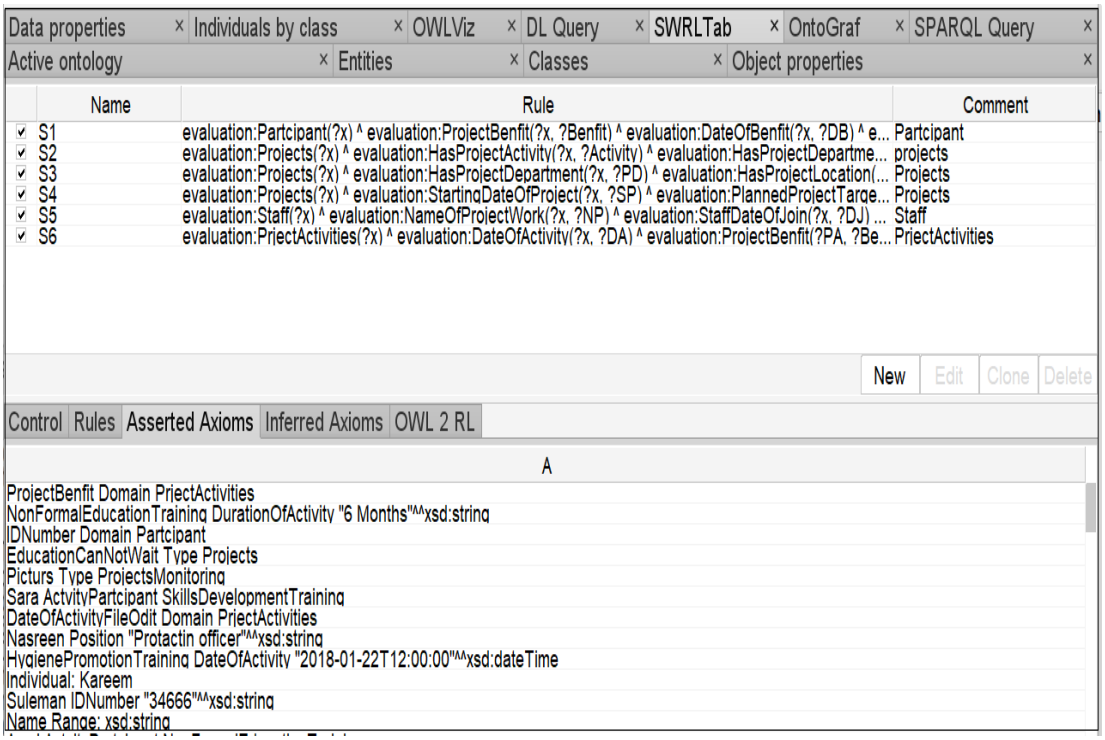
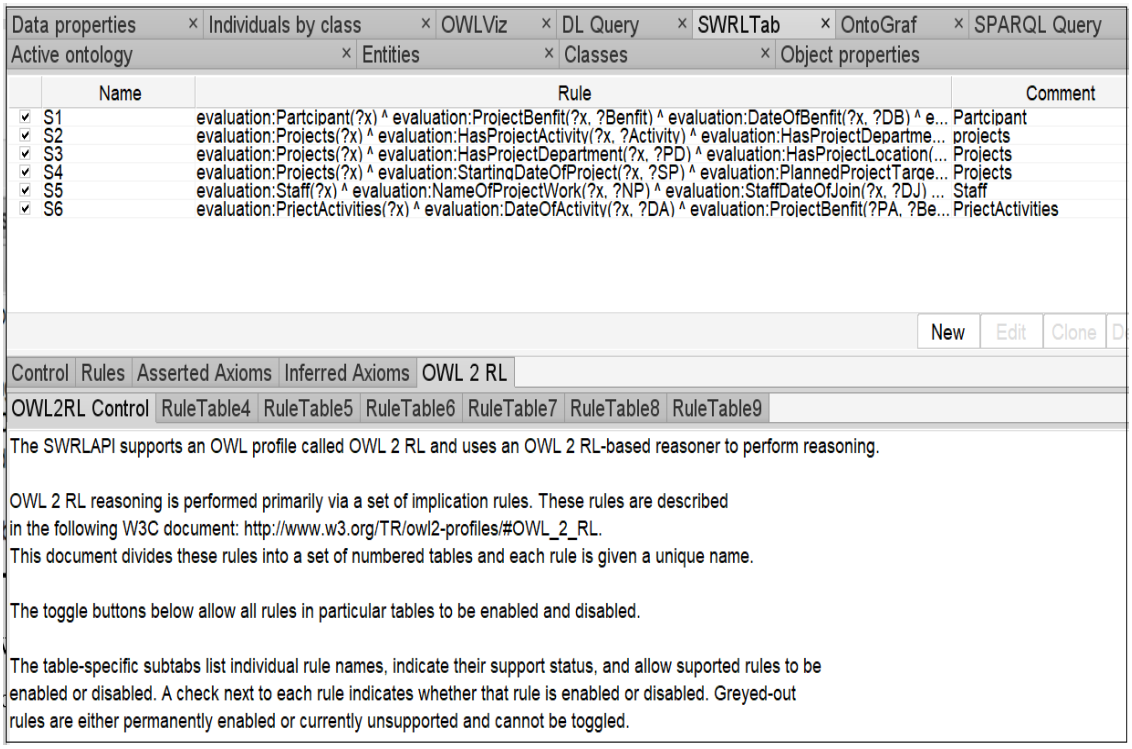


Figure 38: *SWRL OWL2RL Control*.

Source: Author,2022.



All rules are also demonstrated in Table 5.

CHAPTER VIII
Evaluations

In the evaluation chapter, we explain the procedures for assessing the quality of the proposed ontology (Bao et.,2021) (Şah & Wade, 2012) In particular, we use metadata quality metrics that are outlined in first we discuss the functional requirements and then metadata quality of the proposed ontology is discussed.

Functional Requirements

In Table 6 below contain our searching on our ontology, for the SPARQL we installed searching from the classes. We have provided detailed SPARQL queries in chapter 6. to illustrate that these functional requirements can be supported by the proposed ontology.

Metadata Quality

Metadata quality of ontology can be assessed based on the richness of the instances.

Metadata Completeness

Metadata completeness measures how complete is the instances of the proposed ontology (Table 7). For example, project instances must have a start date, end data, report and these properties can be weighted higher than other properties of a project. Then, for each instance type, the minimum metadata quality weight can be calculated based on equation (1):

Equation 1

$$\text{Completeness} = \frac{\text{Weighted sum of relations for each instance}}{\text{minimum instance weight for each instance type}} \quad (1)$$

Table 6: *Functional Support by the proposed ontology.*
Source: Author,2022.

Search	**Browsing**
Staff documentation Full name, Position, email, start day	By staff class
Project Location for all projects.	By Location
The documentation of all projects. Start day, end day, Target,.	By Target, starting and end day of project.
Count number of staff, participant, projects.	By participants
Project which reach the Target on time.	By Target planning number.
Submit all type of reports, which report for which project submit on time and which one not.	By date of submit.
Searching for number of participant who attendance activity, for all project or one project, and duration of activity, in addition of identity which activity reach number(?).	By activities.
Searching for any list(projects, activity, names, document).	Any class we want

Table 7: *Metadata Completeness Calculation for Each Class Instance.*
Source: Author,2022

Class Instance	Required Properties and Weight in parenthesis	Minimum Metadata Quality Weight
Projects	HasProjectDepartment(1) HasProjectLocation(1) ActualMiddelReportSubmitDate(1) PlanningFinalReportSubmitDate(1) ActualFinalReportSubmitDate(1)	11

	ActualProjectTarget(2) StartingDateOfProject(2) PlanningMiddelReportSubmitDate(1) PlaningDateQuarterReportSubmit(1)	
Staff	staffDepartment (2) NameOfProjectWork(1) Name(2) Email(2)	7
Department	StaffDepartment(1)	1
Participant	ActivityParticipant(2) IDNumber(2) ProjectBenfit(1) NumePrarticpant(1) Email(1) StaffDateOfJoin(1)	10
Project Activity/ AssessmentActivities	HasProjectActivity(2) DurationOfActivity(2) DateOfActivity(2) NumberOfPartcipant(2)	8
Project Activity/ DistributionActivities	HasProjectActivity(2) HasDocumnt(2) HasFileOdit(1) DurationOfActivity(2) DateOfActivity(1) NumberOfPartcipant(1) DateofBenefit(1)	10
Project Activity/ SessionActivities	HasProjectActivity(1) HasDocumnt(2) HasFileOdit(1) DurationOfActivity(1) DateOfActivity(1) NumberOfPartcipant(1) DateofBenefit(1)	8
Project Activity/ TrainingActivities	HasProjectActivity(2) HasDocumnt(1) HasFileOdit(1) DurationOfActivity(2) DateOfActivity(2) NumberOfPartcipant(1) DateofBenefit(1)	10

Table 8: *Instance metadata completeness quality.*

Source: Author,2022

Class Instance	Weight Count	Normalized instance quality
Projects	60	60/11=5.45
Department	20	20/1=20
Project Activity/1	16	16/8=2
Project Activity/2	24	24/10=2.4
Project Activity/3	16	16/10=1.6
Project Activity/4	32	32/10=3.2
Participant	60	60/10=6
Staff	60	60/7=8.57

Schema Metrics

Attribute Richness, Inheritance Richness, Relationship Richness, Class Richness and Axiom Class Ratio can be used to assess schema metrics of an ontology.

Attribute Richness (AR)

Attribute Richness (AR) is a measure that shows how many attributes exists on average for all classes as shown in Equation (1). In our ontology AR=33/13=2.53 that shows that classes on average contain at least two attributes.

Equation 2

Attribute Richness $AR=\frac{Number\ of\ Attributes\ of\ all\ classes}{Number\ of\ classes}$ (1)

Inheritance Richness

Inheritance Richness, (IR) is a measure that shows how many Subclasses on average for all classes as shown in Equation (2). In our ontology IR=4/13=0.307 that shows that subclasses on average classes are less than one.

Equation 3

Inheritance Richness $=$

$$=\frac{Number\ of\ inhertance\ Relationships}{Number\ of\ clasess} \text{IR}=\frac{Number\ of\ subclasess}{Number\ of\ clasess} \quad (2)$$

$$\text{IR}=\frac{4}{13}=0.307$$

Relationship Richness

Relationship Richness (RR) is a measure that shows how many non-inheritance relationships on average for subclasses in addition of number of object property as shown in Equation (3). In our ontology RR=11/15=0.733 that shows that number of non-inheritance relationships on subclasses and object property contain less than one.

Equation 4

$$\text{RR}=\frac{Number\ of\ non\ inhertance\ Relationships}{Number\ of\ \ inheritantance\ relationship\ +Number\ of\ non\ inheritance\ relationship} \quad (3)$$

$$\text{RR}=\frac{Number\ of\ object\ properties}{Number\ subclasess+Number\ of\ object\ properties}$$

$$\text{RR}=\frac{11}{4+11}=0.733$$

Average Population

Average Population (AP) is a measure that shows how many individual on average for number of class as shown in Equation (4). In our ontology AP=58/13=4.461 that shows that number of individuals compared to number of classes contain more than four.

Equation 5

$$AP=\frac{Number\ of\ Indvidual}{Number\ of\ class} \quad (4)$$

$$AP=\frac{58}{13} \quad =4.461$$

Class Richness

Class Richness (CR) is a measure that shows how many classes with instances on average for number of classes as shown in Equation (5). In our ontology CR=1/13=0.076 that shows that number of classes with instant on number of classes contain less than one**.**

Equation 6

$$CR=\frac{Number\ of\ \ class\ without\ Instance}{Number\ of\ class} \quad (6)$$

$$CR=\frac{1}{13} \quad =0.076$$

Axiom Class Ratio

Axiom Class Ratio (ACR) is a measure that shows how many Axioms on average for number of class as shown in Equation (5). In our ontology ACR=13/493=0.02253 that shows that number of Axiom on number of classes contain less than one.

Equation 7

$$\text{Axiom Class Ratio}=\frac{Axioms}{Clasess} \quad (5)$$

$$\text{Axiom Class Ratio}=\frac{493}{13}$$

$$\text{Axiom class Ratio}=37.923$$

Cohesion

Cohesion contains a number of roots and the number of leaves.

Number of roots (NOR)=**9**

Number of leaves (NOL)=**12**

Overall, the metadata completeness and schema richness of the ontology is analyzed and demonstrated in this chapter.

CHAPTER IX

Conclusions and Future Work

There is vast amount of data about humanitarian projects' activities, and sometimes it is difficult to collect this data due to the location of the project place and timing. Obtaining accurate measurements for the purposes of monitoring and evaluation of humanitarian projects cannot be an easy task. Furthermore, diverse data from heterogeneous sources are collected; data can be in text, image, video, excel and so forth format. We are able to solve this problem by standardizing the data on the projects' activities by using ontologies. In this way, metadata and source of data are separated. Using the metadata, then extensive queries and reasoning can be applied. We are able to analyze the data for all stages of implementation of these projects from different perspectives (activities, participants and employees) using queries and semantic rules.

In future, we will develop a user-friendly interface that can be used by non-experts to analyze humanitarian projects. In this thesis, we deal with four projects on NGOs, but in the future, we could use the same way with more expansion to cover many projects with the same issues in this way, we could deal with the same sector and evaluates many projects in the same time, we will have opportunity to compare the result of many NGOs in the same area or same sectors.

Many countries need to know the results of projects that have been implemented in their land and to make sure if there is a gap or issues in the implementation. Many INGOs have good expirations to cover their gaps or weak points in their projects by good documentation. Since auditing cannot discover weak points, using semantic metadata and extensive rules, it can be possible to identify weak sides of humanitarian projects in advance.

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Appendix 1

owl rdf/xml file

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[17]   // Object Properties
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        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ReportSubmit">
[109]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[110]       <rdfs:range
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects"/>
[111]    </owl:ObjectProperty>
[112]
[113]
[114]
[115]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StaffDepartment -->
[116]
[117]    <owl:ObjectProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StaffDepartment">
[118]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[119]       <rdfs:range
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Department"/>
[120]    </owl:ObjectProperty>
[121]
[122]
[123]
[124]    <!--
[125]    ///////////////////////////////////////////////////////////////////////////////
[126]    //
[127]    // Data properties
[128]    //
[129]    ///////////////////////////////////////////////////////////////////////////////
[130]     -->
[131]
[132]
[133]
[134]
[135]    <!--
        https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualDateQuarterReportSubmit  --
        >
```

```
[136]
[137]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualDateQuarterRepo
        rtSubmit">
[138]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[139]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[140]   </owl:DatatypeProperty>
[141]
[142]
[143]
[144]   <!--
        https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualFinalReportSubmitDate -->
[145]
[146]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualFinalReportSub
        mitDate">
[147]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[148]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[149]   </owl:DatatypeProperty>
[150]
[151]
[152]
[153]   <!--
        https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualMiddelReportSubmitDate   --
        >
[154]
[155]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualMiddelReportSu
        bmitDate">
[156]       <rdfs:subPropertyOf rdf:resource="http://www.w3.org/2002/07/owl#topDataProperty"/>
[157]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[158]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[159]   </owl:DatatypeProperty>
[160]
[161]
[162]
[163]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualProjectTarget -->
[164]
```

```
[165]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActualProjectTarget">
[166]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects"/>
[167]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[168]   </owl:DatatypeProperty>
[169]
[170]
[171]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DateOfActivity -->
[173]
[174]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DateOfActivity">
[175]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[176]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[177]   </owl:DatatypeProperty>
[178]
[179]
[180]
[181]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DateOfActivityFileOdit -->
[182]
[183]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DateOfActivityFileOdit
        ">
[184]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[185]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[186]   </owl:DatatypeProperty>
[187]
[188]
[189]
[190]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DateOfBenfit -->
[191]
[192]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DateOfBenfit">
[193]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant"/>
[194]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[195]   </owl:DatatypeProperty>
[196]
[197]
[198]
[199]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DurationOfActivity -->
[200]
```

```
[201]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DurationOfActivity">
[202]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[203]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[204]   </owl:DatatypeProperty>
[205]
[206]
[207]
[208]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Email -->
[209]
[210]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Email">
[211]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[212]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[213]   </owl:DatatypeProperty>
[214]
[215]
[216]
[217]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#EndingDateOfProject -->
[218]
[219]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#EndingDateOfProject">
[220]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects"/>
[221]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[222]   </owl:DatatypeProperty>
[223]
[224]
[225]
[226]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#IDNumber -->
[227]
[228]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#IDNumber">
[229]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant"/>
[230]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[231]   </owl:DatatypeProperty>
[232]
[233]
[234]
[235]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Name -->
[236]
```

```
[237]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Name">
[238]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[239]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[240]   </owl:DatatypeProperty>
[241]
[242]
[243]
[244]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#NameBenficiary -->
[245]
[246]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#NameBenficiary">
[247]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant"/>
[248]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[249]   </owl:DatatypeProperty>
[250]
[251]
[252]
[253]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#NumberOfPartcipant -->
[254]
[255]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#NumberOfPartcipant">
[256]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[257]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#integer"/>
[258]   </owl:DatatypeProperty>
[259]
[260]
[261]
[262]   <!--
        https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlaningDateQuarterReportSubmit -
        ->
[263]
[264]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlaningDateQuarterRep
        ortSubmit">
[265]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[266]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[267]   </owl:DatatypeProperty>
[268]
[269]
```

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[270]
[271]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlannedProjectTarget -->
[272]
[273]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlannedProjectTarget">
[274]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects"/>
[275]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#integer"/>
[276]   </owl:DatatypeProperty>
[277]
[278]
[279]
[280]   <!--
        https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlanningFinalReportSubmitDate  --
        >
[281]
[282]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlanningFinalReportSu
        bmitDate">
[283]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[284]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[285]   </owl:DatatypeProperty>
[286]
[287]
[288]
[289]   <!--
        https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlanningMiddelReportSubmitDate
        -->
[290]
[291]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PlanningMiddelReportS
        ubmitDate">
[292]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/
        >
[293]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[294]   </owl:DatatypeProperty>
[295]
[296]
[297]
[298]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Position -->
[299]
```

```
[300]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Position">
[301]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[302]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
[303]   </owl:DatatypeProperty>
[304]
[305]
[306]
[307]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StaffDateOfJoin -->
[308]
[309]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StaffDateOfJoin">
[310]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[311]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[312]   </owl:DatatypeProperty>
[313]
[314]
[315]
[316]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StartingDateOfProject -->
[317]
[318]   <owl:DatatypeProperty
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StartingDateOfProject"
        >
[319]       <rdfs:domain
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects"/>
[320]       <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#dateTime"/>
[321]   </owl:DatatypeProperty>
[322]   <rdf:Description>
[323]       <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#AllDisjointProperties"/>
[324]       <owl:members rdf:parseType="Collection">
[325]           <rdf:Description
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#StartingDateOfProject"/
        >
[326]       </owl:members>
[327]   </rdf:Description>
[328]
[329]
[330]
[331]   <!--
[332]   ///////////////////////////////////////////////////////////////////////////////
[333]   //
[334]   // Classes
[335]   //
```

```
[336]   ////////////////////////////////////////////////////////////////////////////////
[337]    -->
[338]
[339]
[340]
[341]
[342]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Answers -->
[343]
[344]   <owl:Class
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Answers"/>
[345]
[346]
[347]
[348]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#AssesmentActivities -->
[349]
[350]   <owl:Class
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#AssesmentActivities">
[351]       <rdfs:subClassOf
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[352]   </owl:Class>
[353]
[354]
[355]
[356]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Department -->
[357]
[358]   <owl:Class
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Department"/>
[359]
[360]
[361]
[362]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DistrbutionActivities -->
[363]
[364]   <owl:Class
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#DistrbutionActivities">
[365]       <rdfs:subClassOf
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[366]   </owl:Class>
[367]
[368]
[369]
[370]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant -->
[371]
[372]   <owl:Class
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant"/>
[373]
```

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[374]
[375]
[376]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities -->
[377]
[378]    <owl:Class
       rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[379]
[380]
[381]
[382]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectLocation -->
[383]
[384]    <owl:Class
       rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectLocation"/>
[385]
[386]
[387]
[388]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects -->
[389]
[390]    <owl:Class
       rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Projects"/>
[391]
[392]
[393]
[394]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation -->
[395]
[396]    <owl:Class
       rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsEvaluation"/>
[397]
[398]
[399]
[400]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsMonitoring -->
[401]
[402]    <owl:Class
       rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsMonitoring"/>
[403]
[404]
[405]
[406]    <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#SessionActivities -->
[407]
[408]    <owl:Class
       rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#SessionActivities">
[409]        <rdfs:subClassOf
       rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[410]    </owl:Class>
[411]
```

```
[412]
[413]
[414]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff -->
[415]
[416]   <owl:Class rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[417]
[418]
[419]
[420]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#TrainingActivities -->
[421]
[422]   <owl:Class
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#TrainingActivities">
[423]       <rdfs:subClassOf
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#PrjectActivities"/>
[424]   </owl:Class>
[425]
[426]
[427]
[428]   <!--
[429]   ///////////////////////////////////////////////////////////////////////////////////
[430]   //
[431]   // Individuals
[432]   //
[433]   ///////////////////////////////////////////////////////////////////////////////////
[434]    -->
[435]
[436]
[437]
[438]
[439]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActivityReport -->
[440]
[441]   <owl:NamedIndividual
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActivityReport">
[442]       <rdf:type
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsMonitoring"/
        >
[443]   </owl:NamedIndividual>
[444]
[445]
[446]
[447]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Ahmed -->
[448]
[449]   <owl:NamedIndividual
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Ahmed">
```

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[450]     <rdf:type
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[451]     <NameOfProjectWork
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ChangingHygineBeh
      aivior"/>
[452]     <StaffDepartment
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#WASH"/>
[453]     <Email rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Ahmed@NGO.org</Email>
[454]     <Name rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Ahmed Ali</Name>
[455]     <Position rdf:datatype="http://www.w3.org/2001/XMLSchema#string">WASH Engineer</Position>
[456]     <StaffDateOfJoin rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2018-01-
      20T08:00:00</StaffDateOfJoin>
[457]   </owl:NamedIndividual>
[458]
[459]
[460]
[461]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Amal -->
[462]
[463]   <owl:NamedIndividual
      rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Amal">
[464]     <rdf:type
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Partcipant"/>
[465]     <ActvityPartcipant
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#NonFormalEducatio
      nTraining"/>
[466]     <ProjectBenfit
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#EducationCanNotWa
      it"/>
[467]     <IDNumber rdf:datatype="http://www.w3.org/2001/XMLSchema#string">12345</IDNumber>
[468]     <NumberOfPartcipant rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Amal
      Ibrahim</NumberOfPartcipant>
[469]   </owl:NamedIndividual>
[470]
[471]
[472]
[473]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Anbar -->
[474]
[475]   <owl:NamedIndividual
      rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Anbar">
[476]     <rdf:type
      rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectLocation"/>
[477]   </owl:NamedIndividual>
[478]
[479]
[480]
```

```
[481]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#AttendanceSheet -->
[482]
[483]   <owl:NamedIndividual
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#AttendanceSheet">
[484]       <rdf:type
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectsMonitoring"/
        >
[485]   </owl:NamedIndividual>
[486]
[487]
[488]
[489]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Ayad -->
[490]
[491]   <owl:NamedIndividual
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Ayad">
[492]       <rdf:type
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Staff"/>
[493]       <NameOfProjectWork
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ChangingHygineBeh
        aivior"/>
[494]       <StaffDepartment
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#WASH"/>
[495]       <Name rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Ayad salem</Name>
[496]       <Position rdf:datatype="http://www.w3.org/2001/XMLSchema#string">WASH Engineer</Position>
[497]       <StaffDateOfJoin                rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">2018-01-
        04T13:00:00</StaffDateOfJoin>
[498]       <StaffDateOfJoin
        rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Ayad@NGO.org</StaffDateOfJoin>
[499]   </owl:NamedIndividual>
[500]
[501]
[502]
[503]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Bagdad -->
[504]
[505]   <owl:NamedIndividual
        rdf:about="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Bagdad">
[506]       <rdf:type
        rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ProjectLocation"/>
[507]   </owl:NamedIndividual>
[508]
[509]
[510]
[511]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#BaslineAssesment -->
[512]
```

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[513]  <owl:NamedIndividual
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[543] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Anbar"/>
[544] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Bagdad"/>
[545] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Duhok"/>
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[547] <ReportSubmit rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#MiddelProjectReport"/>
[548] <ReportSubmit rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#QuarterProjectReport"/>
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[568] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Anbar"/>

[569] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Duhok"/>

[570] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Musel"/>

[571] <ReportSubmit rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#EndProjectReport"/>

[572] <ReportSubmit rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#MiddelProjectReport"/>

[573] <ReportSubmit rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#QuarterProjectReport"/>

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[596]   <!-- https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Education -->
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[633] <HasDocumnt rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#ActivityReport"/>
[634] <HasDocumnt rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Picturs"/>

[635] <HasDocumnt rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#RecivingForm"/>
[636] <HasFileOdit rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#True"/>
[637] <HasProjectActivity rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#EducationCanNotWait"/>
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[651] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Anbar"/>
[652] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Musel"/>
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[680]    <rdf:type
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[711]       <HasDocumnt
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[726] <HasProjectDepartment rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#EmpoweringWomen"/>
[727] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Duhok"/>
[728] <HasProjectLocation rdf:resource="https://neu.edu.tr/internationalnongovenmentorganization/project/evaluation#Musel"/>
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[751]     <HasDocumnt
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[752]     <HasDocumnt
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Appendix 2
Ethical Approval Document

Date: 12/1/2023

To the **Graduate School of Applied Sciences**

The research project titled “Standardization Of Humanitarian Projects Monitoring And Evaluation Cycle Using Semantic Web” has been evaluated. Since the researcher(s) will not collect primary data from humans, animals, plants or earth, this project does not need to go through the ethics committee.

Title: Prof Dr
Name Surname: Melike Şah Direkoğlu

Signature:

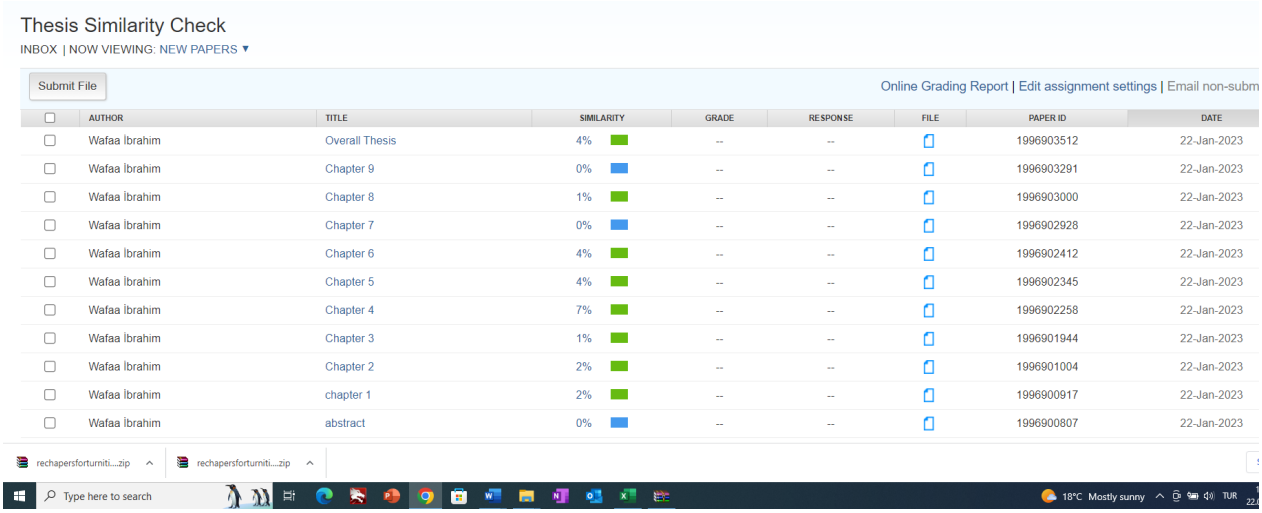
Role in the Research Project: Supervisor

Appendix 3

Similarity Report

Chapters	Percentages
Abstract.doc/docx	0%
Chapter 1.doc/docx	2%
Chapter 2.doc/docx	2%
Chapter 3.doc/docx	1%
Chapter 4.doc/docx	7%
Chapter 5.doc/docx	4%
Chapter 6.doc/docx	4%
Chapter 7.doc/docx	0%
Chapter 8.doc/docx	1%
Conclusions.doc/docx	0%
*All.doc/docx	4%

*All.doc/docx document must include all your thesis chapters (except cover page, table of contents, acknowledge, declaration, references, appendix, list of figures, list of tables, and abbreviations list).



Regards,

Prof Dr Melike Şah Direkoğlu.