Final Assignment: Semantic Technologies

Tittle: Extended Neglected Tropical Disease Ontology (Extended_NTDO)

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Ontology Requirements Specification Document	
1	**Purpose**
	The general goal of the TropicalDisease ontology and data model is to facilitate data sharing and interoperability among the tropical diseases concepts.
2	**Scope**
	The scope of the TropicalDisease ontology is defined by concepts related to Tropical Diseases like endemic zones, vectors, parasites, treatments, diagnosis and others. The concepts are built internally or imported from external data sources needed in the tropical disease domain and related healthcare domain.
3	**Implementation Language (optional)**
	Ontology Web Language.
4	**Intended End-Users (optional)**
5	**Intended Uses**
	Data model generation External data sources integration.
6	**Ontology Requirements**
	a. **Non-Functional Requirements**
	Annotated in English Linked standards when possible Open license Modular Online availability
	b. **Functional Requirements: Lists or tables of requirements written as Competency Questions and sentences**
	This section is provided for each specific domain in the confluence pages.
7	**Pre-Glossary of Terms (optional)**
	a. **Terms from Competency Questions**

	b. **Terms from Answers**
	c. **Objects**

Functional requirements:

req-1 A tropical disease is a neglected disease in this ontology.
req-2 Tropical diseases occur in different geographical zones.
req-3 Tropical diseases are produced by infectious agents.
req-4 Infections agents are one of virus, bacteria or parasites.
req-5 Tropical diseases can be transmitted by vectors.
req-6 People suffer from tropical disease.
req-7 Health care system is composed of health care infrastructure and people.
req-8 Health care infrastructure can be either hospitals or primary health centers.
req-9 A healthcare infrastructure has patients and staff.
req-10 Person can be either staff or patients.
req-11 One of the doctors is the director.
req-12 The staff could be doctors or nurses.
req-13 Tropical diseases are diagnosed by doctors.
req-14 Tropical diseases are dealt with in the healthcare system.
req-15 Patients are treated in healthcare infrastructure.
req-16 Patients are attended by doctors and nurses.
req-17 Patients have a clinical history.
req-18 Clinical history contains treatment and diagnosis.
req-19 Treatments are prescribed by doctors.
req-20 Diagnoses are made by doctors.

The Extended_NTDO includes classes and reuse sources from:

-BioPortal - TropicalDisease

http://purl.obolibrary.org/obo/NCIT_C28356

-The CIn UFPE - Neglected Tropical Disease

https://www.cin.ufpe.br/~ntdo/OWLFiles/ntdo.owl

-From a Github repository - Hospital

https://github.com/praxitelisk/Hospital-OWL-Ontology/blob/master/Hospital-ver2.owl

The ontology has been created using Protégé (5.5.0), adding the specific requirements and reusing the ontologies published already.

The ontology has been analyzed using the reasoner Hermit and validated with “oops!”. There are still minor errors including missing annotations in the properties. However, we consider that they are not crucial.

There are different naming conventions (Uppercase convention). We are aware of this issue because we wanted to have “_” in the name of the species.

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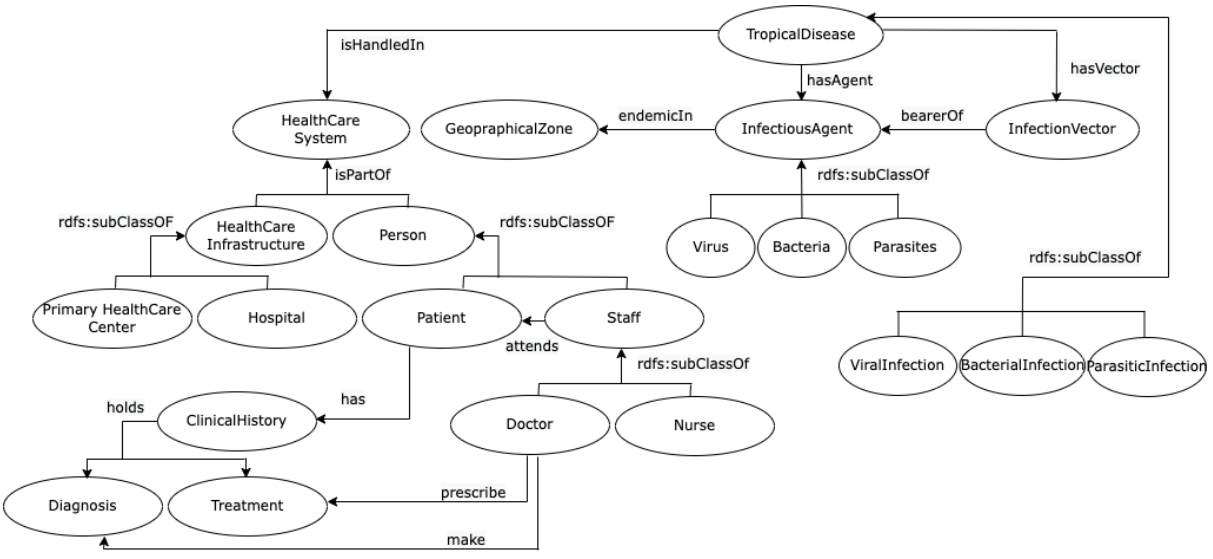
The knowledge graph has been generated using Diagrams.net.



We have performed queries in SPARQL in protege:

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 xntdo: <http://www.semanticweb.org/Extended_NTDO#>
SELECT ?subject ?object
        WHERE { ?subject xntdo:suffers ?object }
```

subject	object
Patient101	LeishmaniasisProcess
Patient102	TaeniasisProcess

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 xntdo: <http://www.semanticweb.org/Extended_NTDO#>
SELECT ?subject ?object
        WHERE { ?subject xntdo:isTreatedIn ?infrastr .
                ?subject xntdo:isAttendedBy ?object}
```

subject	object
Patient102	Nurse103
Patient101	Doctor101
Patient101	Nurse101

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 xntdo: <http://www.semanticweb.org/Extended_NTDO#>
SELECT ?subject ?object
        WHERE { ?subject xntdo:affects ?patient.
                ?patient xntdo:isTreatedIn ?object}
```

subject	object
AfricanTrypanosomiasisProcess	Center4

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 xntdo: <http://www.semanticweb.org/Extended_NTDO#>
SELECT ?subject ?object
        WHERE { ?subject xntdo:suffers ?disease.
                ?disease xntdo:endemicIn ?object}
```

subject	object
Patient103	Tunisia

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 xntdo: <http://www.semanticweb.org/Extended_NTDO#>
SELECT ?subject ?object
        WHERE { ?subject xntdo:directs ?infrastr.
                ?object xntdo:isTreatedIn ?infrastr}
```

subject	object
Doctor101	Patient101

The Extended_NTDO has been uploaded to the GitHub repository: pablocatarecha/SemanticTech_MUBC_UPM and published through Ontoology.