UNIVERSITY OF WATERLOO
Cheriton School of Computer Science

CS486/686 **Introduction to Artificial Intelligence**
Fall 2016

GROUPWORK 8/ASSIGNMENT 2 LAB:
GETTING STARTED: AN OWL ONTOLOGY FOR A QUESTION-ANSWERING APPLICATION

Note: You may do this exercise individually or in teams of 2.

Group names (surname first):
Signature:_____
Signature:_____

Assignment 2 Problem: An Ontology for Question-Answering

Your task for Assignment 2 is to construct an OWL ontology for a specific domain that will be the "knowledge base" for an automated Question-Answering (QA) system. In today's Groupwork you will consider the framework for your ontology.

Question-Answering applications can have many purposes, including:

(a) Online product helpline;
(b) Automated "concierge" for making reservations (e.g., flights, hotels, restaurants);
(c) Virtual city guide;
(d) Newsfeed querying app;
(e) Social media analysis;
(f) Digital library query engine.

. . . and so forth. **You are encouraged to use your imagination and be creative about the purpose of a QA system.**

A Simple Knowledge Engineering Methodology[1]

Some fundamental rules in ontology design:

1. There is **no one correct way** to model a domain—there are always viable alternatives. The best solution almost always depends on the application that you have in mind and the extensions that you anticipate.
2. Ontology development is necessarily an **iterative** process.
3. Concepts in the ontology should be close to objects (physical or logical) and relationships in your domain of interest. These are most likely to be nouns (objects) or verbs (relationships) in sentences that describe your domain.

Step 1: Choosing a Domain for a Question-Answering Application

To begin with you should choose **only one domain** to focus on and define its scope—consider these key questions:

- What is the domain that the ontology will cover?
- For what types of questions should the information in the ontology provide answers?
- Who will use and maintain the ontology?

The answers may change during the ontology-design process, but at any given time they help limit the scope of the model.

[1] Material from Natalya F. Noy & Deborah L. McGuinness "Ontology Development 101: A Guide to creating your first ontology"; Tania Tudorache, "Ontology 101: The basics of developing ontologies", Protege Short Course, Stanford, March 21, 2016.

Step 2: Competency Questions

It is helpful to begin by listing a set of "competency questions", i.e., the typical questions the ontology will be used to answer. Competency questions are helpful for:

- Defining the scope of the ontology;
- Defining the vocabulary (main terms) of the ontology;
- Testing the ontology.

For example, for a Shopping ontology we might have such competency questions as:

- What beverages are sugar-free?
- What types of gluten-free breads are there?
- Does this product contain nuts (or traces of nuts)?
- Is this product sold at any stores in Waterloo?

Some further tips on Competency Questions:

- Competency questions can have different forms:
  - Yes/No questions: "Is this product high in salt?"
  - Wh-questions: "Which supplements are vegetarian?"; "Where can I buy dairy-free ice cream?"
- Try to formulate questions that can be **formalized**:, e.g., "What supplements are vegetarian?"
- Try to cover different areas of the domain **systematically**.
- Have a brainstorm session with yourselves playing the role of domain experts to come up with these questions.

  Each person might cover a different area of the domain, or you can develop your own brainstorming strategy.
- At the end of the session, group the questions, and document them;
- Create **test cases** based on these questions—use these questions throughout the development of your ontology.[2]

Steps 3 and on: To be continued in Assignment 2

[2]We will see later how to use DLQuery in OWL's Protege editor to assist with these test cases.