An ontology for healthcare systems

François Goyer 1, Paul Fabry 2, Adrien Barton 1,2,3 and Jean-François Ethier 1,2

1 Centre Interdisciplinaire de Recherche en Informatique de la Santé de l’Université de Sherbrooke (CIRIUS), Université de Sherbrooke, Quebec, Canada
2 Groupe de Recherche Interdisciplinaire en Informatique de la Santé (GRIIS), Université de Sherbrooke, Quebec, Canada
3 Institut de Recherche en Informatique de Toulouse (IRIT), CNRS, Université de Toulouse, France

ICBO 2022
Plan

- Background and motivations
- Representation of healthcare systems
- Discussion
Background

- Learning health system with data-mediation platform (PARS3)
- Ontology of clinical knowledge and activities
- Ontological model converted to relational model*
  - No instance, no data annotated

*Christina Khnaisser, Luc Lavoie, Benoit Fraikin, Adrien Barton, Samuel Dussault, et al.. Using an ontology to derive a sharable and interoperable relational data model for heterogeneous healthcare data and various applications. Methods of Information in Medicine, Schattauer, 2022, 10.1055/a-1877-9498
Background

- Ontologies for several domains
  - Drugs prescription (PDRO), laboratory results (LABO)
- Different domains processes regrouped under a general health care related process: health procedure
  - *health procedure* composed of 1+ *health activity*
Motivations

- Health procedures must be considered in their context
  - Health procedure: clinical data – (what)
  - Health procedure’s context: medico-administrative data – (where, by whom..)
- Need an ontological representation of healthcare compatible with our ontology of health procedures
Motivations

- Some related classes already exist in OBO Foundry ontologies
  - OMRSE, OGMS, OPMI, GSSO, ENVO...
Motivations

- So why not “just” reuse them?
- Classes from different ontologies are not always compatible
- Adding axioms may distort meaning of classes
Representation of healthcare Principles

- Not using a class label ‘healthcare’ because of the polysemy of the term
- Representation of main entities involved in healthcare and how they are related to each other
- Based on BFO and following OBO Foundry principles
A planned process guided by the objective of contributing to a desired effect on the health status of an organism or several organisms achieved through the treatment, diagnosis, or prevention of disease or injury.
A health procedure under the responsibility of an organisation that aims at providing a desired effect on the health status of individuals and their communities.
A healthcare service delivery that targets some specified individuals.

A health procedure under the responsibility of an organization that aims at providing a desired effect on the health status of individuals and their communities.
A temporally-connected individual healthcare service delivery that aims to improve, maintain or restore the health of some participating organism.

A healthcare encounter during which the recipient is located in a healthcare facility at least for part of its participation as a recipient.
A health worker who is a member of a healthcare organization.
Discussion

- Roles vs object properties
  - Use of roles complex for modelization
    - Lead to ternary relations
    - Possible with FOL or instanciation
Discussion

- Roles vs object properties
  - Dedicated object property
    - Simple and less ambiguous
  - But risk of multiplying properties
Discussion

- New classes rather than a new ontology
- Possible integration with existing ontologies
  - Theory vs practice...
- Integration within the broader domain of services
Thank you

paul.fabry@usherbrooke.ca