An ontology for healthcare systems

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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

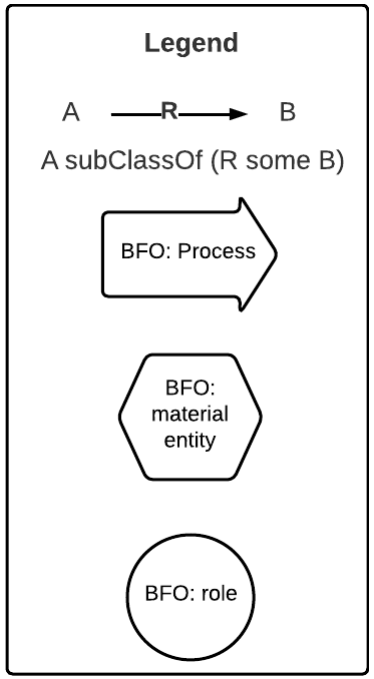
- Some related classes already exist in OBO Foundry ontologies
  - OMRSE, OGMS, OPMI, GSSO, ENVO…

Motivations

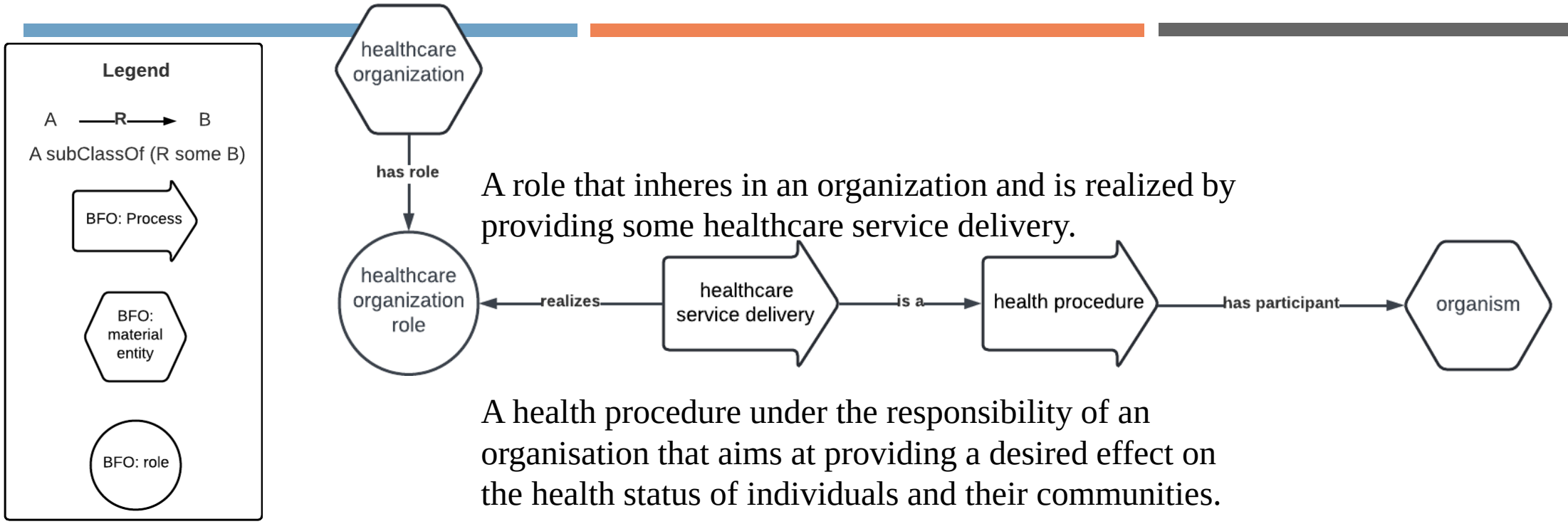
- So why not “just” reuse them ?
  - Classes from different ontologies are not always compatible
  - Adding axioms may distort meaning of classes

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

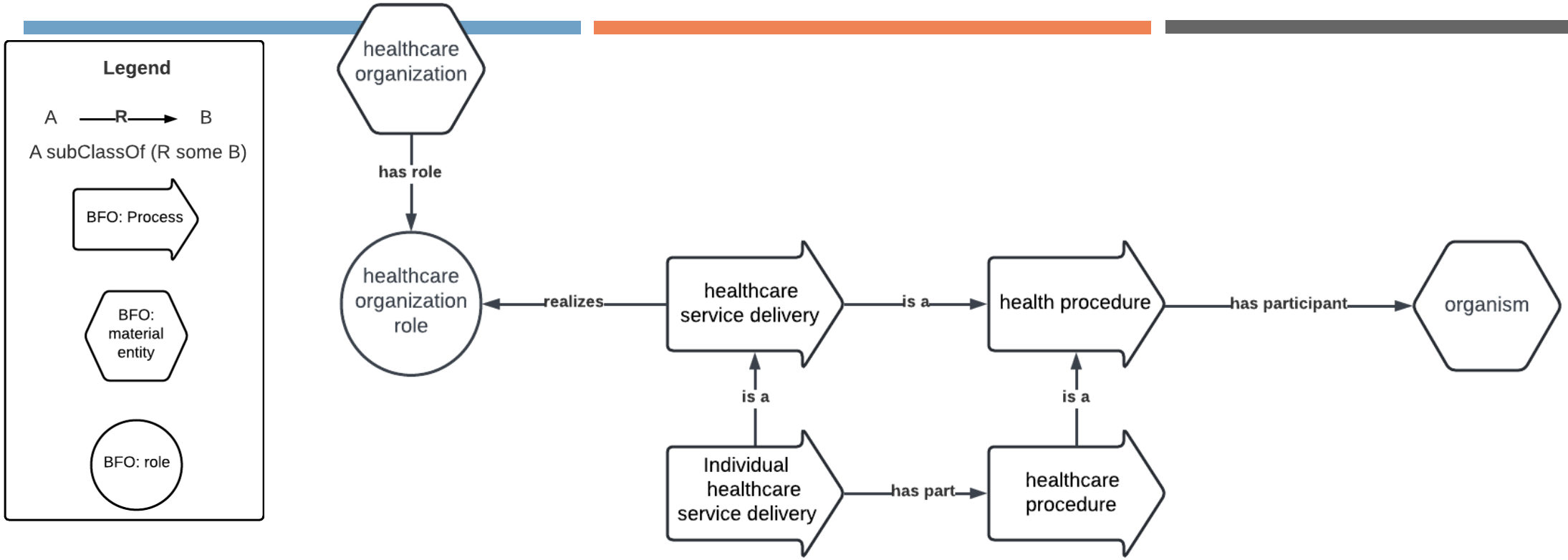


A planned process guided by the objective of contributing to a desired effect on the health status of an organism or several organisms achieved through the treatment, diagnosis, or prevention of disease or injury.



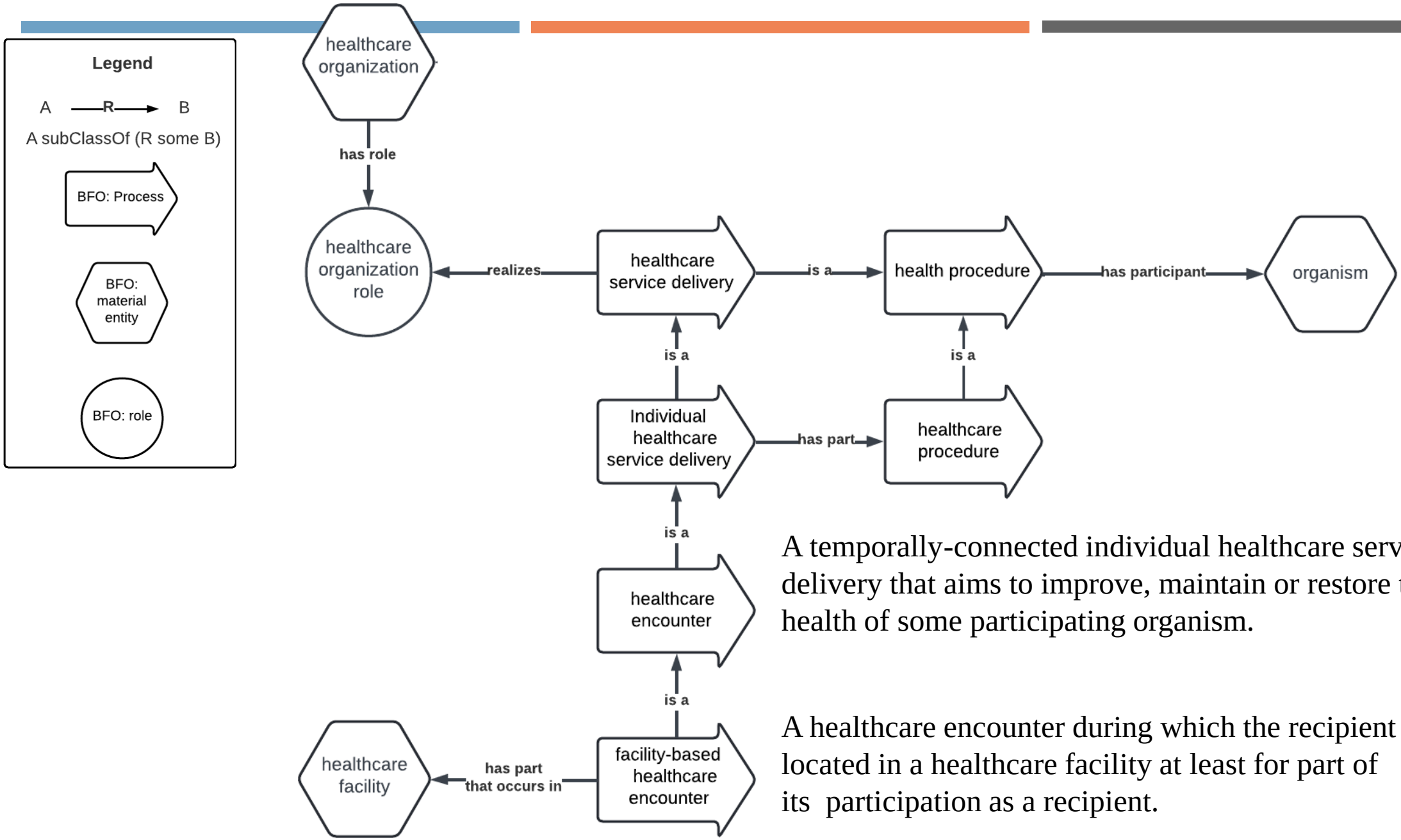
A role that inheres in an organization and is realized by providing some healthcare service delivery.

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.



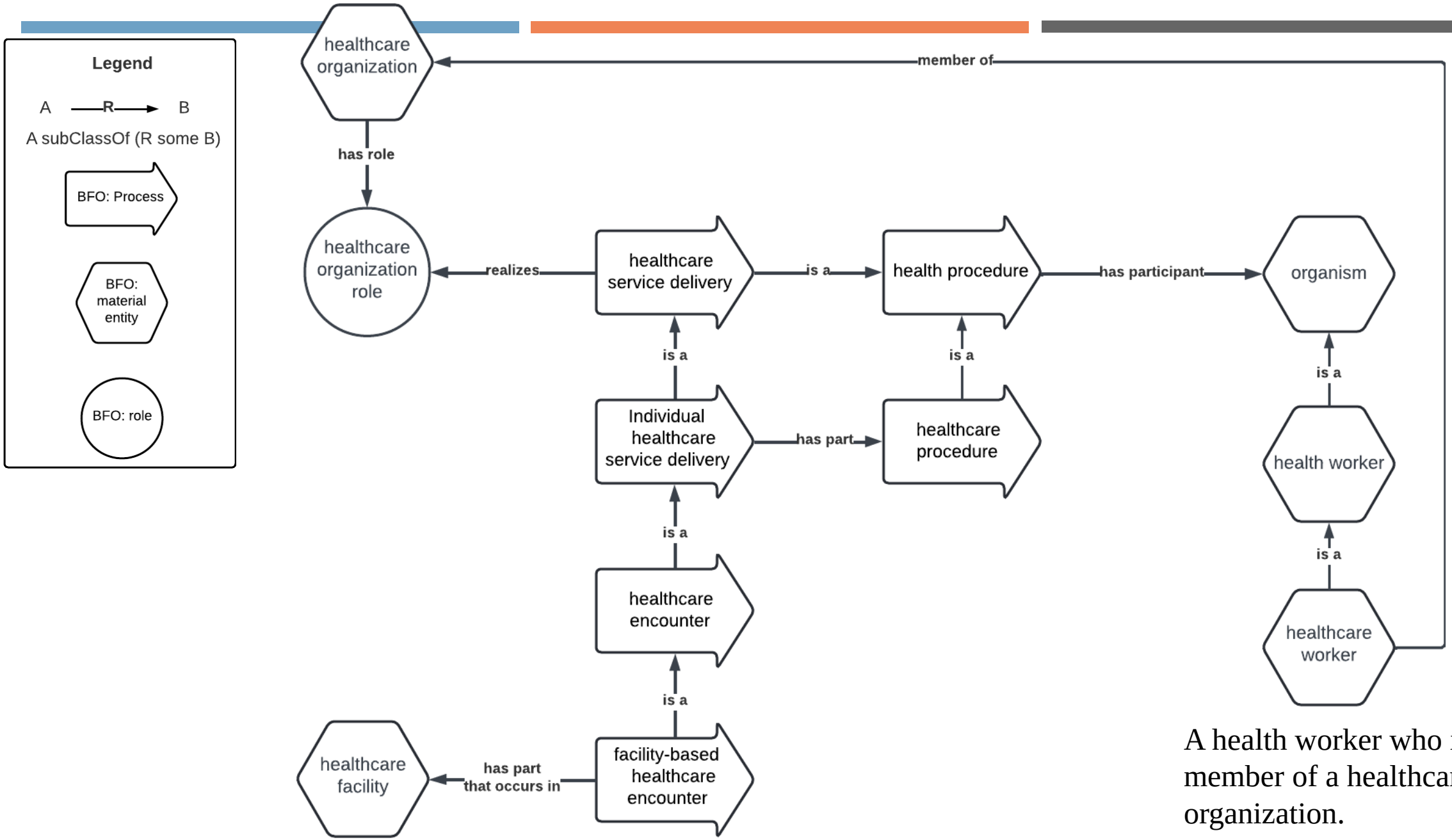
A healthcare service delivery that targets some specified individuals.

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.

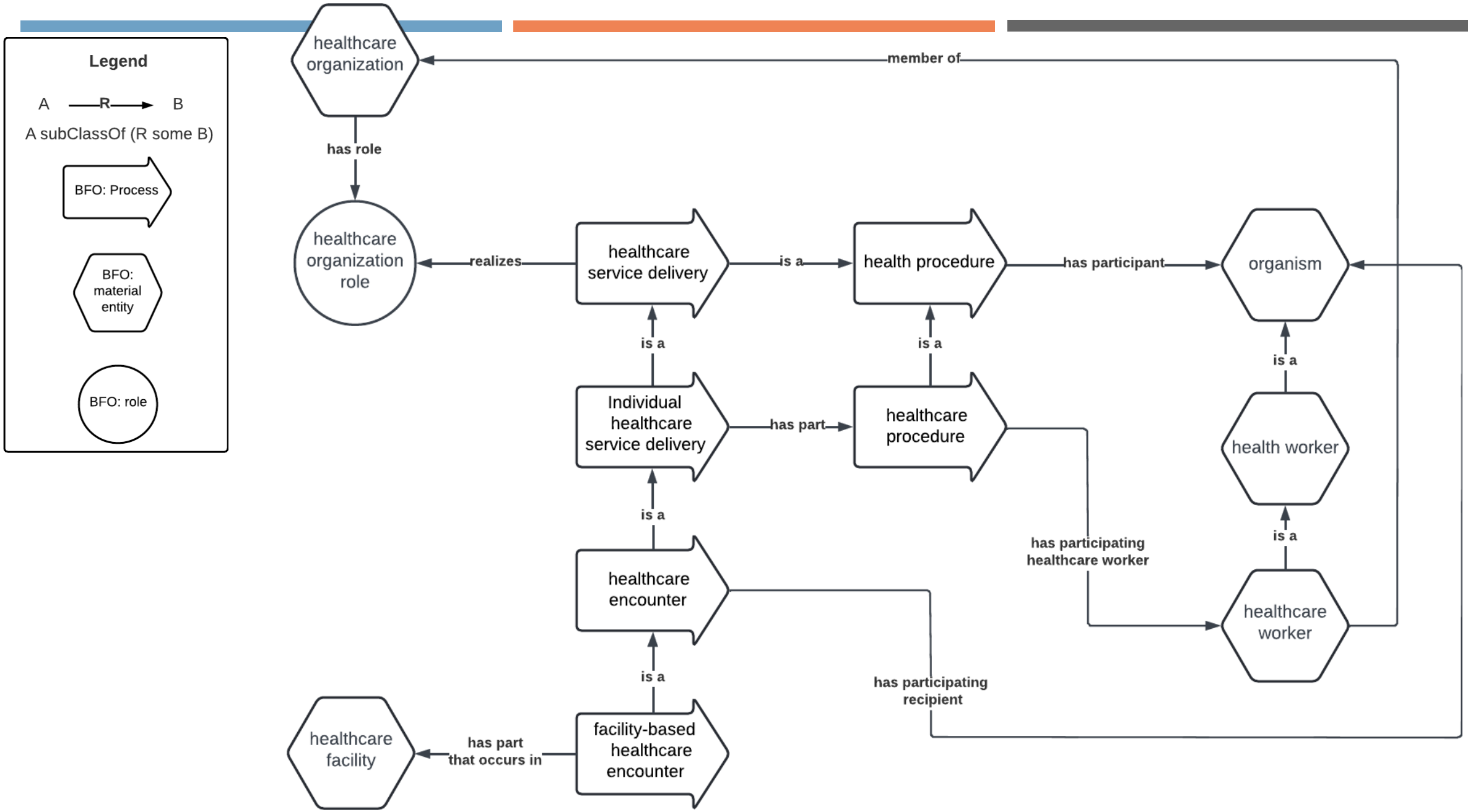


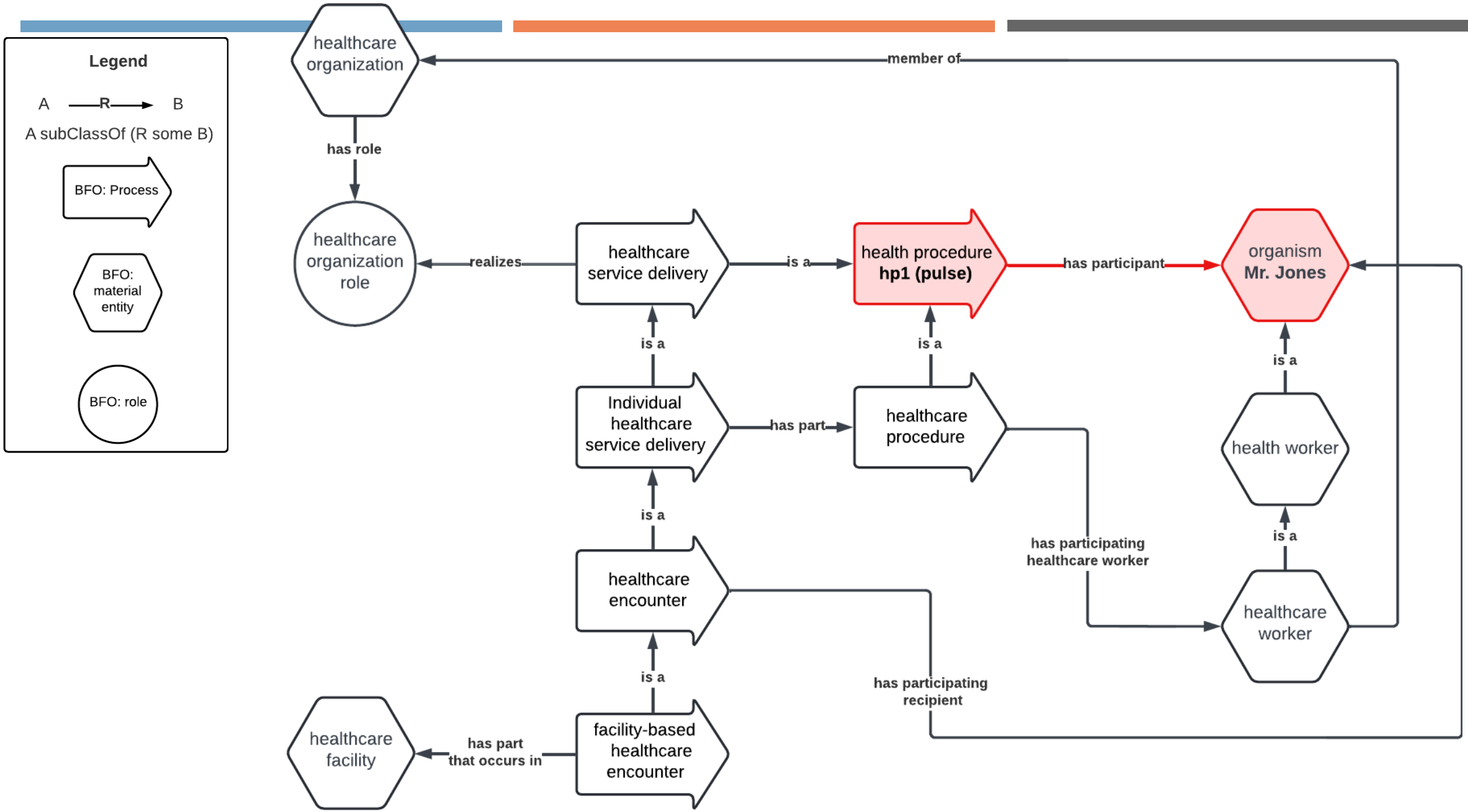
A temporally-connected individual healthcare service delivery that aims to improve, maintain or restore the health of some participating organism.

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.


Legend
A
R
B
A subClassOf (R some B)
BFO: Process
BFO: material entity
BFO: role
healthcare organization
member of
has role
healthcare organization role
realizes
healthcare service delivery
is a
health procedure
has participant
organism
is a
is a
is a
Individual healthcare service delivery
has part
healthcare procedure
health worker
is a
has participating healthcare worker
healthcare encounter
healthcare worker
is a
has participating recipient
is a
healthcare facility
has part that occurs in
facility-based healthcare encounter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health procedure hp1 (pulse)
has participant
organism Mr. Jones
is a
is a
is a
Individual healthcare service delivery
has part
healthcare procedure
health worker
is a
has participating healthcare worker
healthcare encounter
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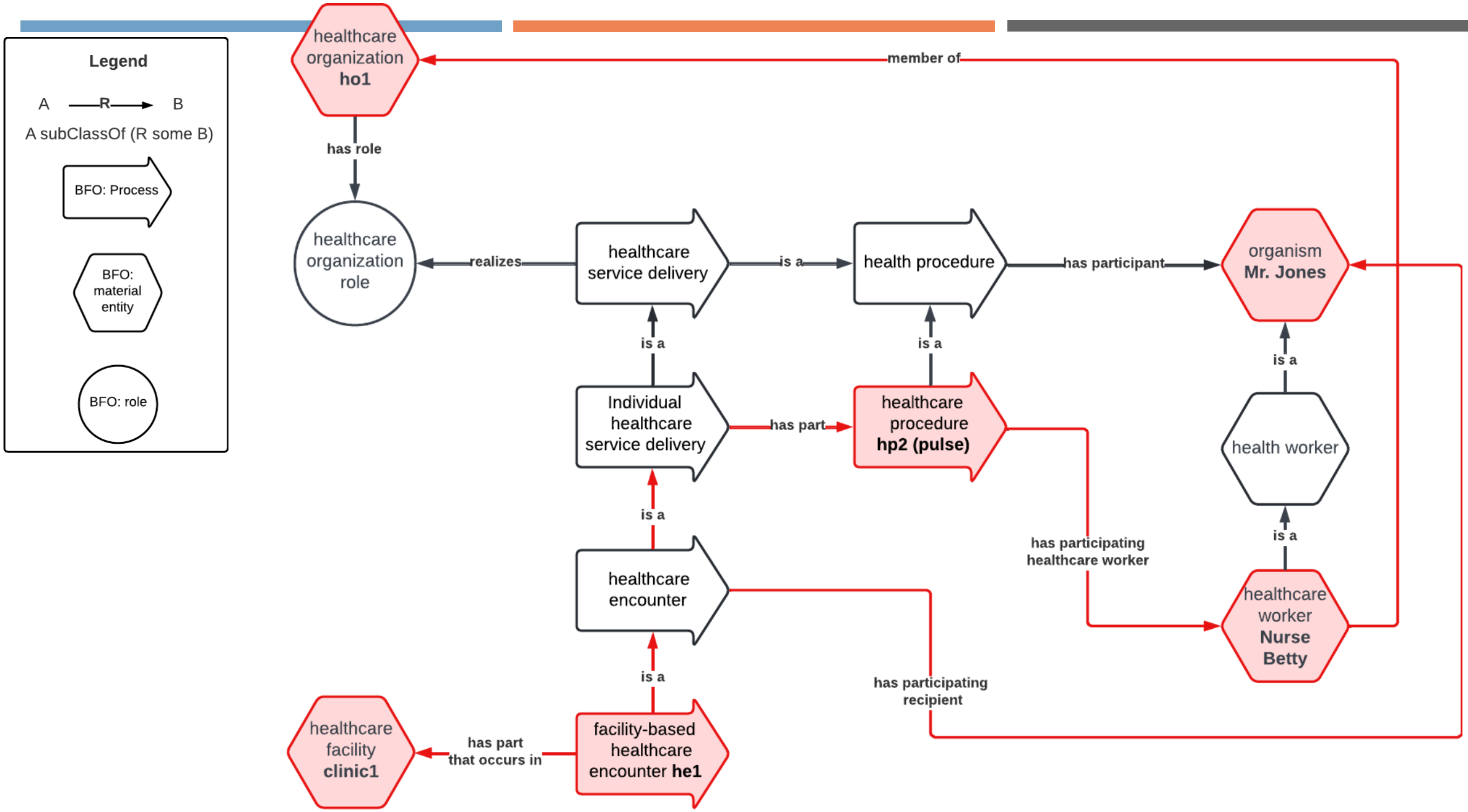
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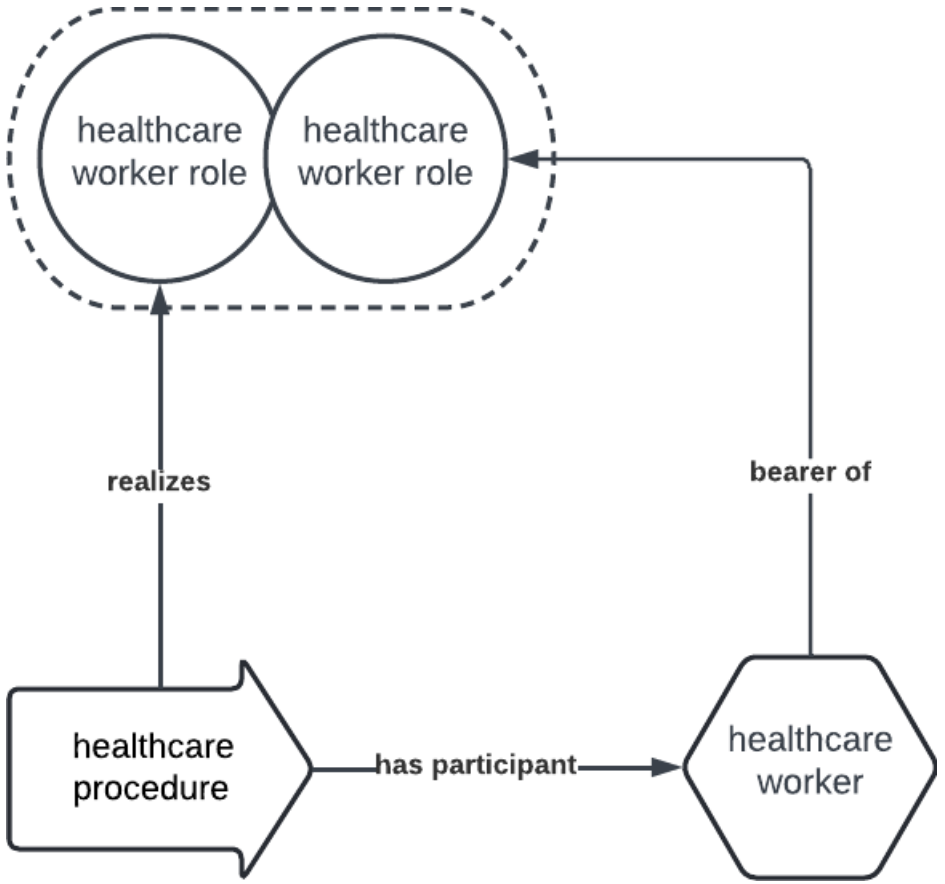
is a
Individual healthcare service delivery
has part
healthcare procedure hp2 (pulse)
health worker
is a
has participating healthcare worker
is a
healthcare encounter
healthcare worker Nurse Betty
is a
has participating recipient
healthcare facility clinic1
has part that occurs in
facility-based healthcare encounter he1

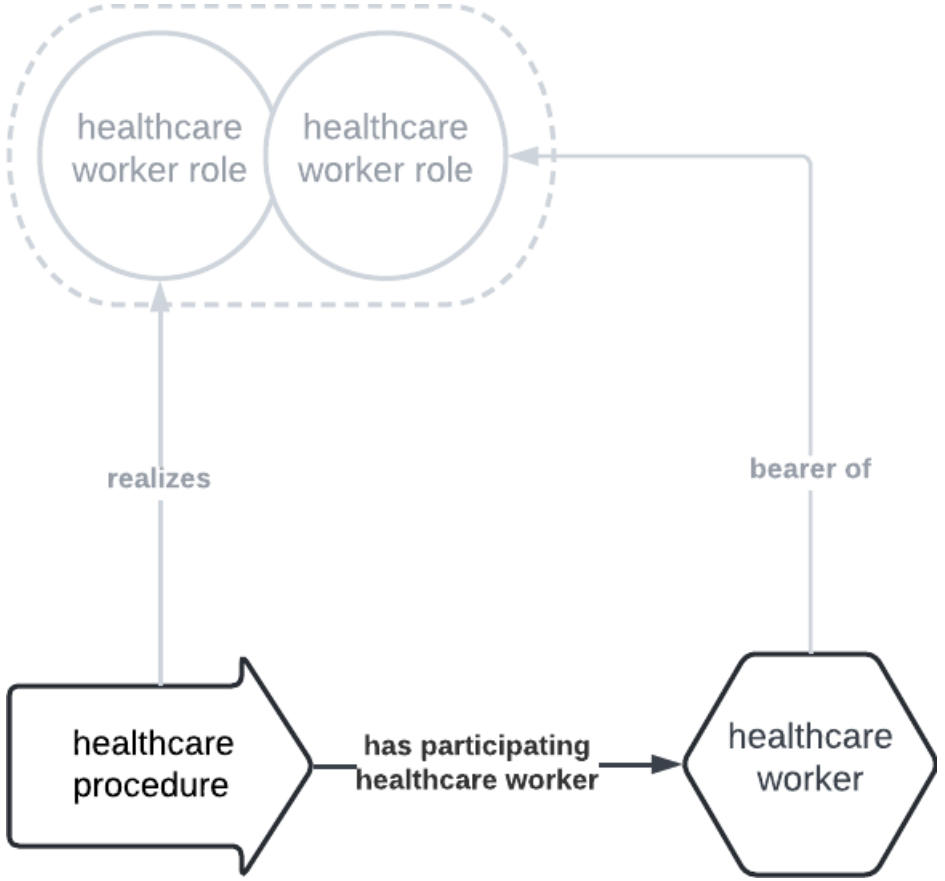
Discussion

- 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

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