DL Requirements from Medicine and Biology

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The need for semantically precise domain descriptions has given raise to an increasing number of so-called bio-ontologies covering different fields of biology and medicine. Examples are the Foundational Model of Anatomy (FMA)[5], the Gene Ontology [3] and the Open Biological Ontologies [6]. There are several examples of the conversion of biomedical ontologies into T-Boxes [2, 7, 1, 8] in order to enable terminological reasoning. The biomedical domain, however, exhibits certain peculiarities. Besides the generally large size of biomedical terminology systems (10,000 - 100,000 concepts) the physical composition of organisms (anatomy, biological structure) plays an pivotal role which which may impact the performance of description logics implementations:

- Part-Whole hierarchies constitute an important ordering principle.

- Definitory cycles are common, e.g. $Cell \sqsubseteq \exists haspart.Cytoplasm$ and $Cytoplasm \sqsubseteq \exists partof.Cell$.

- Pairwise disjunction in taxonomies, e.g. $Organ \sqsubseteq \neg Tissue$

- Pairwise disjunction in partonomies, e.g. $\exists partof.Trunk \sqsubseteq \neg \exists partof.Head$

- Role inclusion, e.g. $r \circ s \sqsubseteq r$ [4]

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