Goal-models to support communication, planning and guiding of FAIRification

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Implementing the FAIR principles makes data ready for efficient analysis with other data. Workflows for the process of making data FAIR ('FAIRification') describe how the principles can be realised. As a multidisciplinary activity, FAIRification relies on good communication with different expertise involved. However, FAIRification workflows currently do not specify methods to meet this need.

We are designing a method that uses 'goal-oriented models' to support the FAIRification 'objective identification' and 'conceptual modelling' steps. In the former, the motivation(s) for the need for FAIR data are identified. In the latter, goal models are used to define the scope, identify important concepts and validate the resulting conceptual model. The method will also describe best practices and activities for conceptual modelling.

It is expected that the approach will contribute by improving the efficiency of FAIRification procedures, based on clear and easier communication of constraints and intentions among everyone involved in the project; and enhance the interoperability of FAIRified data, based on the expected improvement of the data models that are built following the method. We are currently finalizing the design of the method and running a set of proofs-of-concept to validate and adjust it.

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FAIR Principles

Implementing the FAIR principles [1] makes data more **Findable**, **Accessible**, **Interoperable**, and **Reusable** for humans and computers, and **ready-to-reuse for efficient analysis with other data**. Workflows for the process of making data FAIR ('**FAIRification**') describe how the principles can be realised [2]. The use of FAIR data reduces the time spent by researchers on integrating and curating data.
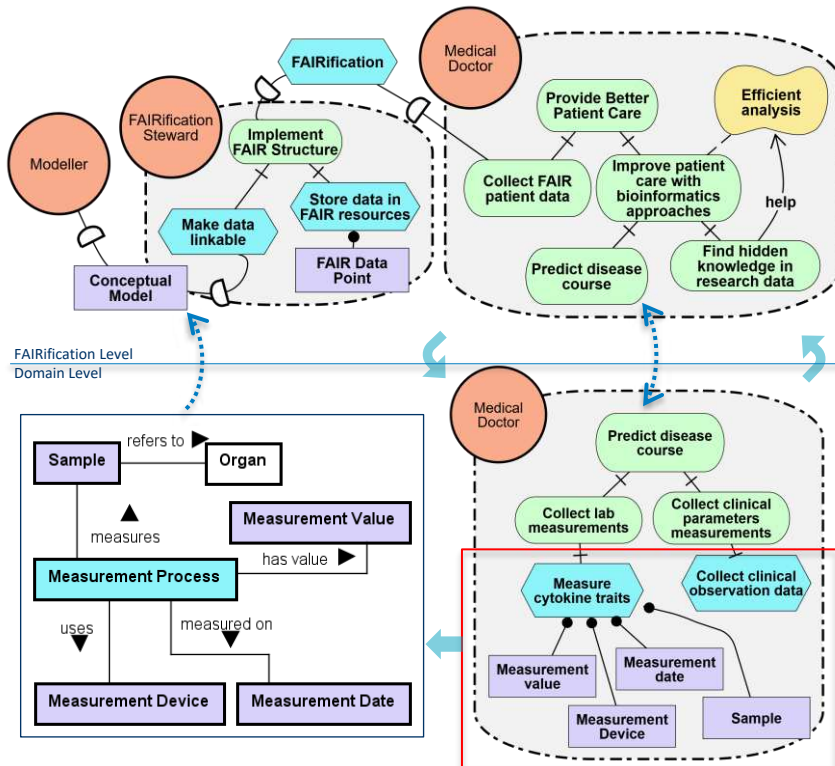
identify FAIRification objective

define semantic (meta)data model

FAIRification Planning

Context: As a multidisciplinary activity, FAIRification needs to be **well-planned**, **communicated** and **guided** among the **different expertise** involved (e.g., software developers, medical doctors). However, FAIRification workflows do not specify methods to meet this need.

Proposal: Goal-modelling techniques for FAIRification management, which introduces a '**Thinking Paradigm' shift** - to work out **"what"** needs to be done by asking **"why"** and **"how"** questions instead.

Goal-models are easy-to-communicate artefacts for identifying the research goals within FAIRification, collaboration between experts, activities that should be performed and prioritized, data concepts that should be modelled and requirements constraints that should be met.

FAIRification Level
Domain Level

Goal-Models for FAIRification objective identification

In this FAIRification step: Goal-Modelling techniques are used to plan, comunnicate and guide FAIRification.
Results: the motivations for the need of FAIR data, the needed **expertise** (and how they should colaborate), which **tasks** should be performed to achieve the objectives, the **resources** used and produced by tasks and the desired **qualities** (and how they are impacted by goals).

Goal-Models for FAIRification Conceptual Modelling

In this FAIRification step: focus on the (meta)data Conceptual Modelling activity. Goal-Models are created specifically for the researcher question. Here, guidelines for the conceptual modelling activity, adapted from "**Goal-Based Ontology Engineering**" methodologies [3] and the use of **F**oundational Ontologies [4] will be provided. The latter are used to label concepts extracted from goal-models with high-level and well-founded ontological concepts, thus improving **interoperability**.

Results: domain relevant concepts that must be defined in the FAIRified data, which are identified by analysing the tasks that must be performed to answer the question, and the resources used or produced by them. The domain goal-model should be aligned with FAIRification goals to guarantee an efficient FAIR implementation.

Expectations

Improvement of FAIRification procedures, based on clear and easier communication of constraints and intentions among everyone involved in the project.

Enhanced interoperability of FAIRified data, based on the expected improvement of the data models that are built following the proposed method.

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