Modular workflow components by FAIR input and output

Francesca L. Bleken[1] and Jesper Friis[1]

[1] SINTEF Industry, P.O. Box 4760 Torgarden, NO-7465 Trondheim, Norway
francesca.l.bleken@sintef.no

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Abstract

A methodology and tools[1,2,3] for populating a knowledge base with FAIR documentation of datasets, models and other resources (e.g. samples, instruments, executed workflows, etc…) by use of semantic technologies is described. All resources will be documented fully EMMO-compliant, which greatly enhances the reusability and cross-domain interoperability. According to the nominalist nature of EMMO[2] individuals must stand for real-world entities. This means that only facts known at documentation time are expressed as individuals in the ABox. Abstracts, such as not yet instantiated datasets or not yet executed models, will be represented as classes in the TBox. Instantiated datasets will in addition be documented according to the DCAT[4] standard, making them accessible to all DCAT-aware data consumers.

A model takes datasets as input and returns datasets as output. The model as well as its input and output are all represented as ontological classes in the TBox. When a model is executed, the computation will be represented with an individual connected to individuals standing for instances of the model input and output. Figure 1 illustrates that models that ontologically fit together become machine interoperable when inputs and outputs are made interoperable down to the numerical level, leaving the running of the model to the executor. Through graph traversal and reasoning it is possible to identify possible workflows. The inputs and outputs are documented with datamodels implemented within the DLite interoperability framework[3], where datamodels are represented as ontological classes and their instances as individuals.
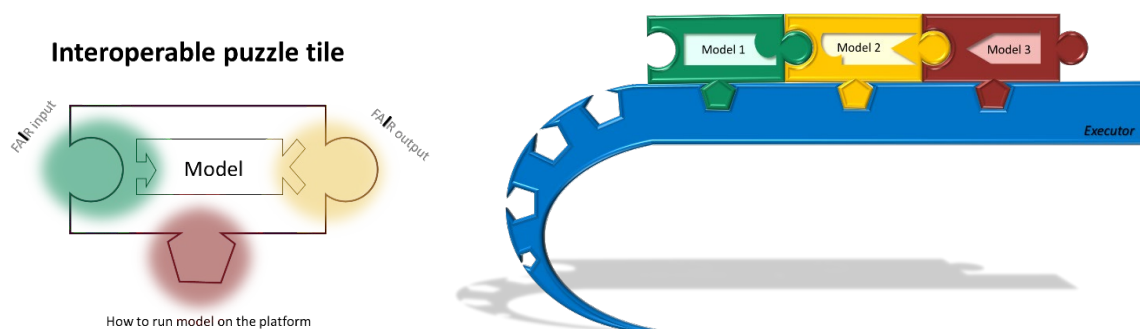

Figure 1. The interoperability layer adds machine interoperability

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[1] https://emmc-asbl.github.io/tripper/

[2] https://emmo-repo.github.io/

[3] https://sintef.github.io/dlite/

[4] https://www.w3.org/TR/vocab-dcat-3/