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Semantic Interoperability Profiles as knowledge base for semantic solutions

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Central for research is the capability to build on existing research outcomes and to aggregate data from different sources to create new research findings. This is particularly true for environmental research, which tries to face global challenges like climate change and biodiversity loss by integrating diverse long-term monitoring and experimental data.

Interoperability is the ability of computer systems to exchange information but to get a shared understanding of the meaning of that information semantic interoperability is required. Shared understanding between all parties involved can be achieved using common standards like vocabularies, metadata and semantic models.

But how can researchers find out which standards are used and by whom? FAIR Implementation Profiles (FIPs), co-developed by GO FAIR Foundation and ENVRI-FAIR in 2020 (https://doi.org/10.1007/978-3-030-65847-2_13) and used by more than 120 communities so far like ENVRIs and WorldFAIR (see also https://fairdo.org/wg/fdo-fipp/), might be a good source of knowledge. This socio-technical approach drives explicit and systematic community agreements on the use of FAIR implementations including domain-relevant community standards, called FAIR-Enabling Resources. The FIP Wizard (https://fip-wizard.ds-wizard.org/) is implemented through the DSW open-source tool as a user interface by which the researcher is asked to answer questions related to each of the Principles by selecting FERs expressed as nanopublications. A nanopublication (https://nanopub.net/) is represented as a machine-interpretable knowledge graph and includes three elements: assertions, provenance, and publication info where in the context of FIPs the assertion contains essential metadata about a FER.

Using the same approach and technology but focusing on semantic interoperability aspects the Semantic Interoperability Profile (SIP) was developed in the context of the EOSC Semantic Interoperability Task Force to interview semantic or data management experts involved in research projects or infrastructures to collectively contribute to a knowledge base of interoperability solutions (https://doi.org/10.5281/zenodo.8102786). The SIP focuses on standards used to implement the Principle F2 (metadata) and the Interoperability Principles (I1, I2, I3 related to semantic artefacts) but queries also about the services used to generate, edit, publish, and transform them, altogether called FAIR Supporting Resources (FSRs). The survey is an ongoing

effort and everybody can contribute to it via the SIP Wizard (https://sip-wizard.ds-wizard.org/). In summary, a SIP is a machine-interpretable collection of resources chosen by a community whereby the collection can be made specific for a data type and a semantic interoperability case study.

FAIR Connect (https://fairconnect.pro/) is being developed to provide a user-friendly, graphics rich dashboard and search engine on nanopublications of type FSR. It will enable users to find FSRs based on its type or label and will inform at the same time by which communities it is used. In a future iteration it will also enable filters on data types and case studies.