

What is it?

The original 'hourglass model' that underpins the successful and scalable growth of the Internet as we know it and its main application, the World Wide Web, will need a rough equivalent in the Internet of FAIR Data and Services (IFDS). Nothing will be fully 'identical' although the IFDS will build on current internet infrastructure wherever possible. However, there are clear similarities.

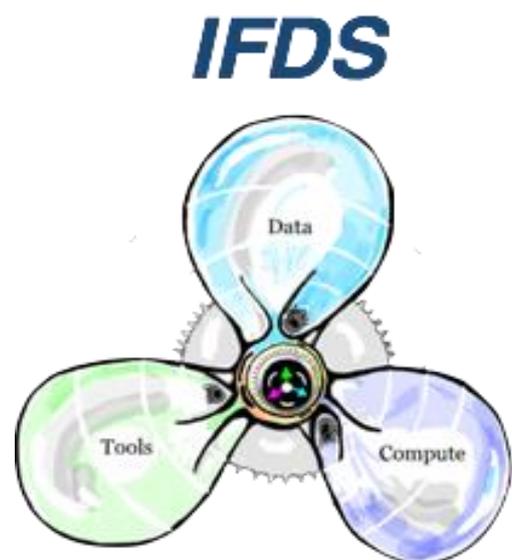
In the 'classical' hourglass model, the TCP/IP is usually placed in the narrow centre of the hourglass: In fact, all blocks below it can be broadly classified as 'underlying network infrastructure' and all levels above the narrow waist are leading to a wide variety of applications with both sides having maximum freedom to make implementation choices.



If we now try to translate the hourglass model to the IFDS, we deal with three fundamentally different basic elements to be 'routed' to find each other at the right time and place and to be maximally effectively used and reused. We have qualified these in the three broad categories DATA, TOOLS, and COMPUTE.

Tools are defined mostly as software-type services that 'act on data', such as for instance virtual machines packaged to travel the IFDS for distributed data analytics, but also, for instance, data repositories. So, we deal with three classes of 'top levels' in three hourglasses, each with their needed under-the-hood network and routing infrastructure.

Intuitively, the IFDS would function most fluently if the infrastructure (where possible the existing internet infrastructure) would operate on a strong, common and globally interoperable networking and routing engine that could efficiently route data to tools, tools to data, and both to the needed compute, as these three elements will increasingly no longer reside in large centralised super storage and HPC facilities but will be distributed 'all over the internet'. We visualise the basics of the IFDS here as a 'propellor' with the engine 'under the hood'.



How to Get there!



Metadata for Machines:

bring together domain experts with metadata and technical specialists to accomplish 5 objectives:

1. Assess the state of metadata practices in the various scientific communities, look for improvements of the current fragmentation and promote good FAIR compliant practices.
2. Using the FAIR principles as a guide, define essential metadata elements and standards to support F, A, I, and R by machines, drawing on the deep domain knowledge of existing communities.
3. Formulate these decisions as machine-actionable templates in a unified way.
4. Register these templates such that they are FAIR and openly accessible and available for re-use by tools that can render these templates in familiar, easy to use web forms, APIs, or other capture tools.
5. Bundle appropriate M4M metadata categories and register them as FAIR compliant metadata components, ensuring higher degrees of Findability, Accessibility, Interoperability, and Reusability by machines.

These 5 objectives result in domain-specific, community built, FAIR metadata schema that compose in part the overall FAIR Implementation Profile of that domain community.

FAIR Implementation Profile:

The FAIR Implementation Profiles representing the implementation strategies of various communities can be used as the basis to optimize the reuse of existing FAIR-enabling resources and interoperation within and between domains. Ready-made and well-tested FAIR Implementation Profiles created by trusted communities can find widespread reuse among other communities, and vastly accelerate convergence onto well-informed FAIR implementations.

FAIR Data Point:

IBM's Linked Data Platform, later to become a W3C standard, harnesses Semantic Web approaches emphasizing operations that are contingent on semantically rich, domain-relevant descriptions. Later, the FAIR Data Point, inspired by the Linked Data Platform, targeted development more explicitly related to the FAIR Principles.

The scalable and transparent 'routing' of data, algorithms, and compute mediated by FAIR Digital Objects or FAIR Data Points is the essential feature of the envisioned Internet of FAIR Data & Services (IFDS).