Co-creating FAIR data standards with professional associations in Engineering disciplines: Can it accelerate FAIR awareness and adoption in engineering disciplines?

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Co-creating FAIR data standards with professional associations in Engineering disciplines: Can it accelerate FAIR awareness and adoption in engineering disciplines?

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When it comes to FAIR data standards and community best practices and initiatives, it is common knowledge that the Engineering field doesn't occupy the centre stage when compared to other disciplines such as life sciences [1].

The leading global organisation on research management, RDA, whose co-founders include the US National Institute of Standards and Technology, acknowledges that the Engineering field's approach to FAIR data standardisation and management have been fragmented and largely bottom-up [2].

In general, the awareness about FAIR principles among researchers in the engineering disciplines is relatively low [3]. We will leave out software engineering in our current discussion since they are clearly an exception given the success of the open source software community.

This doesn't imply that Engineering disciplines don't practice FAIR data. On the contrary, standards are the backbone of Engineering research and practice.

Engineering disciplines have some of the most heterogeneous forms of data and research outputs not limited to numerical data, code, signal data, drawings, images, text, products, models, simulations and prototypes.

Standards in describing such data and outputs in the engineering field are equally diverse: "they cover everything from the simplest screw thread to the most complex information technology network" [4].

The number of global organisations developing and maintaining standards and measures in Engineering disciplines are innumerous. The most notable ones being ISO [5], IEEE standards association [6], ITU [7] and so on.

If we look at the definition of Engineering standards from ASME [8]: "A standard can be defined as a set of technical definitions and guidelines, "how to" instructions for designers, manufacturers, and users." The key focus of standards in the Engineering context, be it data or other outputs, has been interoperability/compatibility, safety, efficiency and compliance. At face value it seems that the engineering standards are not far away from FAIR principles.

However we foresee two main challenges before the Engineering communities get on board the FAIR train.

Firstly, we have to acknowledge that research in Engineering disciplines is different from pure sciences, and the research is very often 'applied', with a strong industrial collaboration or potential for commercialisation.

FAIR principles are closely related to the Open Science movement so there is a misplaced, yet comprehensible, scepticism whether one can pursue commercialisation while investing in 'FAIR' [9].

Secondly, Engineers have strong collaborations with professional associations such as IEEE, not only for dissemination but also for following standards. These organisations are also working on frameworks for research data management but may not call their standards FAIR.
While material science and physical engineering disciplines have more standardised ways of managing and sharing their data and digital objects, the core engineering disciplines such as electrical, electronics as well as emerging fields of big data, IOT etc are new in the standards field.

IEEE for example is currently working on Big Data and Meta Data Management [10] and ISO on AI and Big Data Standards [11]. For these rapidly progressing topics, it is crucial to have professional associations and industry partners onboard while defining FAIR data standards.

To the best of our knowledge there are no formal collaborations between professional associations and organisations like RDA or other FAIR data standards research groups in terms of co-creating standards. Such cooperation might not only be efficient and built upon an ocean of knowledge and expertise, but could also raise awareness and adoption both in university and industry, since engineers on both sides are used to said standards. Through our talk we would like to highlight the importance of such collaboration and spur the RDM/Open Science community to move in that direction, i.e. by involving engineering researchers in collaborations with professional associations as co-creators of FAIR data.

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