Are Fair Digital Objects and Digital Twins the same thing?

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Abstract

Semantically-defined Digital Twins (DTs) and Fair Digital Objects (FDOs) are similar in concept. They both adopt the "Find first" philosphy and they both point to data about some entity in the real world (where "entity" is a very loose definition of any asset, real or imaginary). Are there any parallels that we can draw? Can we use a digital twin plaform to host FDOs?

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The objectives of the GO-FAIR organisation, that data should be Findable, Accessible, Interoperable and Reusable were originally designed to help human beings find and understand data. There has always been a side-helping of desiring computers and machine intelligences to find and use that same data.

The FDOs that people normally think of are datasets, probably time-series data collected over a considerable period, amounting to a large file or a database of records.

What if you took the concept of FDOs and compared it to Digital Twins? If you define a Digital Twin as a virtual representation of a real-world object, entity or concept in that its identity, metadata and data are stored "in the cloud", then it's not a big jump from that to an FDO. If you approach it from the opposite direction - reduce the size of an FDO until it's an individual entity, not a collection, then you arrive at the same destination.

In our proposed talk we will outline the ways that FDOs and semantically-defined digital twins overlap. We will show real-world examples of Digital Twins in action and argue that an FDO of sufficient granularity would serve a very similar purpose.

The Venn diagram of FDOs and Digital Twins is not a circle. Digital twins have attributes that FDOs do not have. For example, they might have real-time feeds of data (such as current temperature, fuel consumption, heart-rate…), or they might have a control interface to change their state (turn on or off, raise a draw-bridge, etc). These dynamic activities hint at one big difference between the two - digital twins have *behaviour.* They

do things in real time. There's nothing in the FDO specification that suggests that's important or required, but we would argue that's from lack of imagination, rather than lack of desirability.

The other lobe of the Venn diagram - the properties that FDOs have that Digital Twins do not - is mainly concerned with historical data. Digital twins are about the "now" of an entity, while an FDO is a historical collection of data, possibly about many entities over a period of time. This mismatch can be overcome by using the Digital Twin concept to define the dataset and using the "data bypass" pattern to allow the dataset to be transferred "out of band" to the requestor, given sufficient access permissions.

Perhaps the strict equivalence that FDOs *are* Digital Twins is going too far. They certainly share many common features and posit a world where machines and humans can cooperate using the same data. Maybe the answer is to have an admixture of the two?

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