

Digital Twin in Retail (Apparel and Footwear)

Carol McDonald, Gneiss Concept, November 15, 2020

Proposal: I think that there should be a clarification between digital twin of human body and digital clone based on the ISO 18825-1:2016. I think that human body twin and digital twin that is noted in the popular vocabulary.

Future Direction

To have another subgroup that is looking at Apparel and Footwear or to add in a clarification within Healthcare about the difference between a digital twin and digital clone.

ISO 18825:12016

<https://www.iso.org/obp/ui/#iso:std:iso:18825:-1:ed-1:v1:en>

ISO 18825-1:2016 definition has virtual human body (fashion avatar) is divided into two key types – virtual clone and virtual twin

Virtual clone – is identical to the body shape of the user

Virtual twin – is not identical to the user; but a close approximation that can be altered by entering parameter retrieved from a population database.

Mass customization or Made to Measure

For mass customization for apparel and footwear, an individual scan is needed. This scan would be closer to the virtual clones and not the definition of a digital twin as currently defined.

<https://www.iiotworldtoday.com/2018/05/01/custom-shoes-and-bottles-digital-twin-technology-grows/>

While there is a growing market for standardized products such bottles, digital twins could ultimately lead to new approaches for manufacturing products such as shoes and earbuds, Perez said. Already, SAP is working with several companies to create custom insoles. But in the future, Perez expects this trend to expand to include shoes customized to the anatomy of the wearer’s feet. “Most of the time, shoe sizes only provide a length measurement. Sometimes they provide width, but they don’t account for the foot’s volume,” Perez said. “Many people who buy shoes online put the shoes on and find they aren’t very comfortable because the volume isn’t right. Or they might find that certain brands fit them better, but the way shoes fit can even vary from model to model within a brand.”

The definition of digital twin

https://www.researchgate.net/publication/343495192_User_centered_development_of_a_Digital_Twin_concept_with_focus_on_sustainability_in_the_clothing_industry

From page 661

The Digital Twin is a technological concept, which originated in the context of virtual product development and validation. There are many different definitions in research and industry for DTs (see (Stark and Damerou, 2019, Tao et al., 2019, Negri et al., 2017)), however in this paper, the definition by Stark and Damerou, 2019 is used. According to Stark and colleagues, a DT is “a digital representation of

an active unique product [...] or unique product service system [...] that comprises its selected characteristics, properties, conditions and behaviors by means of models, information and data within a single or even across multiple lifecycle phases” (Stark and Damerau, 2019). DTs should be able to communicate with users, other objects and among themselves, which implies an interoperability across different IT-Systems, data bases and locations (Ríos et al.). Boschert and Rosen describe the DT as a support system for the physical product (Boschert and Rosen, 2016). Hence, a certain amount of intelligence needs to be considered. A DT can be described with regard to its elements and its characteristics (see DT 8-dimension model by (Stark and Damerau, 2019)). The Design Elements (DE) (Stark et al., 2019) on a technological level are hardware (DE 1), software (DE 2), data repository (DE 3), Digital Master data and models (DE 4), Digital Shadow (DE 5) and intelligence (DE 6). The spectrum of application scenarios and therefore characteristics of DTs expanded over the last years from partial physical twins in aerospace (Glaessgen and Stargel, 2012) to enhanced simulation capabilities (Rosen et al., 2015). Recently, DTs have mainly been applied in the manufacturing of mechatronic, highly complex products (Tao et al., 2017, Rosen et al., 2015). Current research and industrial prototypes focus on the life of a Digital Product Twin beyond the engineering and production phase and integrate services for customers (Tao et al., 2017). Here, the DT is seen as a possibility to cyclically connect all life cycle phases and enable feedback functions. The characteristics of a DT differ heavily depending on its main purpose and the application environment.

Another quote on page 661.

There are industrial examples of DTs, such as the virtual men’s underwear try-on, where the DT is created of a person’s body and the clothing is individually customized with regard to size and compression (Cheng and Kuzmichev, 2018).

Medicine

<https://medicalfuturist.com/digital-twin-and-the-promise-of-personalized-medicine/>

I think that this is good discussion about digital twins that have been customized to the individual. The initial model is clearly from a population data and the sensors. It is not a scan of the individual, but the sensing is from an individual. From this perspective, the definition is closer to the industrial definition of the digital twin.

Portions from this article.

Now imagine applying this concept to medicine: a virtual representation of the human body and its organs where the effects of drugs can be studied. This sounds like what in silico trials and organs-on-a-chip aim to achieve.

*But imagine a virtual representation of individual people on whom every known drug for that person’s condition can be tried. This will allow the deduction of the optimal treatment. It can even monitor that virtual “being” and alert **before** a medical condition arises. Thus, the real person can undergo preventive measures. This is what the digital twin model in healthcare, which delves into the realm of personalized medicine, promises.*

Another segment

*While organizations like the Swedish Digital Twin Consortium push for the idea, **we are still far from a completely digitized version of ourselves**. However, we might already have digital versions of our organs that could serve as templates for the future of personalized care.*