Digital twins and dataspaces: A win-win

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The success of generative Artificial Intelligence (AI), such as ChatGPT, has brought data into the spotlight. Without training data, there would be no ChatGPT. As many of us have experienced hallucinations with ChatGPT, we understand that the quality of ChatGPT results is not solely determined by the quantity of data. Instead, it relies on the training data having the appropriate information content and quality. Digital twin templates provide the variables or attributes to ensure that right information content is considered. Dataspaces can help to collect high-quality and truthful values or datapoints for these variables to turn templates into "living" twins.

Digital twin as data product

Just as ChatGPT relies on the right data, your business applications also require the appropriate data or data product. This entails refining raw data to ensure relevant information content, quality, and formatting (Crosby & Schlueter Langdon 2019). A data product is "refined and readily usable data with defined information content, quality, and accessible to various software applications and use cases (adapted from Schlueter Langdon & Sikora 2020; also McKinsey's Desai et al. 2022a, 2022b; see Data products: Digital twins). Enter digital twins: these are data products that depict a digital model with all relevant variables or attributes of an intended or existing real-world physical object, system, process, or person. Digital twins serve as effectively indistinguishable digital counterparts, and therefore, inherently require the right information content and quality.

Short-cut to automation success: Digital twins

As outlined by McKinsey and illustrated in Figure 1, the standard monetization process begins with raw data, followed by its refinement into a tailored data product that aligns with the requirements of a software application designed to automate a specific use case (McKinsey's Desai et al. 2022a, 2022b). The greater the distance in this journey, the more time it takes to achieve break-even. A shortcut to quicker return on investement (RoI) involves commencing with data products, such as digital twins.

From digital twin templates to "living" twins: Values for variables

Digital twin templates or models specify the variables or attributes necessary to ensure the inclusion of relevant information content. Bringing a digital twin to life requires assigning values to these variables. Variables signify measurable or assignable elements, and values

are the specific data points or outcomes linked to those variables. Variables function as placeholders or categories for measurable aspects, while values are the particular data points, observations, and measures associated with those variables. The relationship is one of dependency, as the values assigned to variables are essential for comprehending the truthful characteristics of a digital twin.
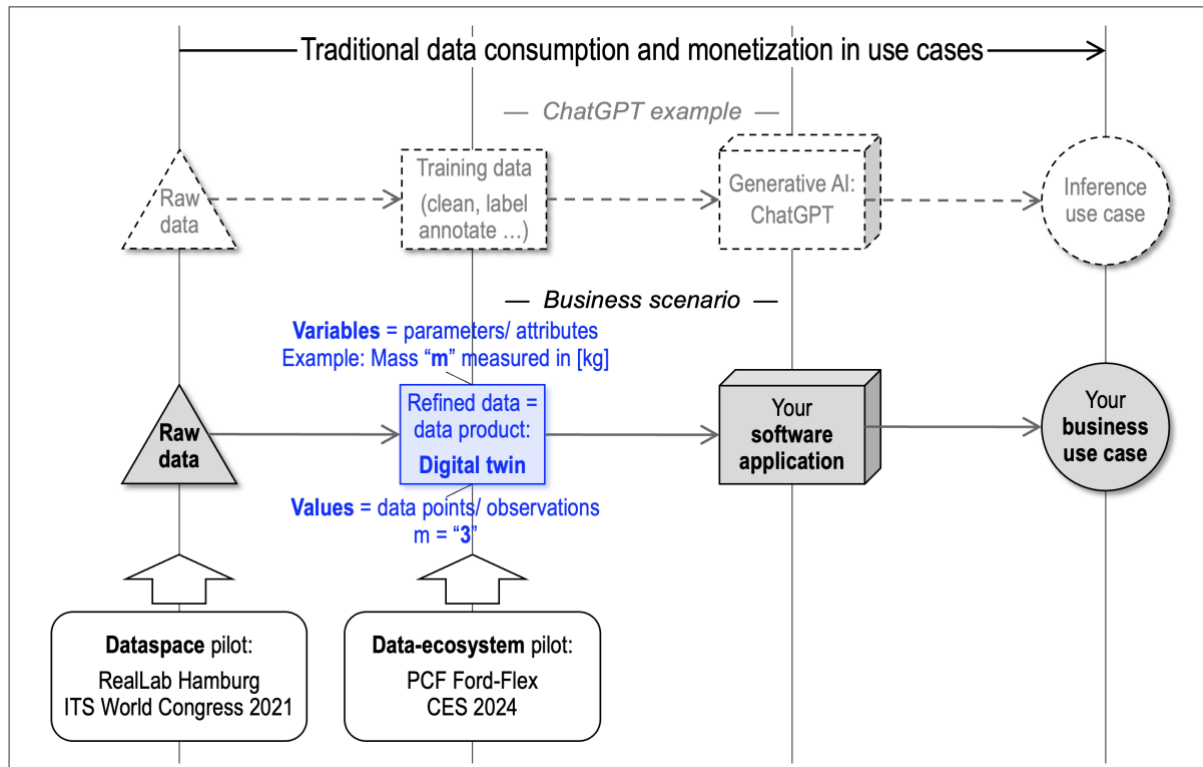

Figure 1: Use case monetization short-cut with a digital twin as refined data or data product

Catena-X data ecosystem advantage: Super-apps with digital twins

Dataspace technology has emerged to make more and better raw data available as it enables data sharing with data sovereignty protection (see Dataspaces 101). This capability has been successfully demonstrated in a pioneering pilot of RealLab Hamburg. Lately, first data ecosystems, like Catena-X, have emerged that go beyond merely providing a dataspace network for data exchange. This data ecosystem offers readily usable building blocks, including super-apps designed for specific use cases, accompanied by corresponding data products or digital twin templates. In contrast to building McKinsey's data monetization chain from the ground up, Catena-X presents a modular, Lego-style approach to use case automation: Chose the Catena-X ecosystem, then pick a certified C-X carrier or operating company like Cofinity-X, and finally, within the operating company's app store, one can choose a C-X certified application. This innovative approach was showcased in a live data chain at CES 2024, demonstrating the sharing of CO2 or product carbon footprint (PCF) tracking data.

Case studies: PCF-Pilot@CES and RealLabHH@ITS

How to obtain CO2 emission or product carbon footprint (PCF) values from the suppliers of the parts used in your product? This has been successfully demonstrated at CES 2024 in Las Vegas. Flex and Ford have partnered with T-Systems International (TSI) and IBM to launch the automotive industry's first PCF tracking pilot with a live data chain across multiple supply chain tiers. The pilot demonstrates the readiness of commercial solutions based on Catena-X[1] standards with trusted identities provided by our partner Cofinity-X and open-source technology. Participants in the pilot can:

- Execute data exchange across participants in a sandbox environment provided by TSI based on open-source Catena-X technology from Eclipse Tractus-X for free.
- Get connected into an OEM-Tier1-Tier2+ data chain in this sandbox using a fully Catena-X certified TSI connectivity product for free.
- The IBM Supply Chain Intelligence Suite (SCIS) will be used to trace and analyze exchanged PCF values along the supply chain using an intuitive graphical user interface.

Figure 1 illustrates how Catena-X provides a RoI short cut as it provides digital twins as refined data products. This contrasts with an earlier case study, a first dataspace pilot based on gen 1 technology from International Data Spaces Association (IDSA, link). This RealLab Hamburg pilot demonstrated how dataspace technology can provide the date required to orchestrate and offer the citizens of the city of Hamburg a novel seamless intermodal travel solution across multiple modes of travel, such as micro-mobility integrated with public transport.[2] This solution was launched for use by visitors of the 2021 ITS World Congress in Hamburg, and delivered faster A-to-B travel speeds of up to 30%. Back then, all components from raw data to refined data to super-app had to be created from scratch.

Econ lessons: 2 value levers – vertical and horizontal benefits

These case studies revealed two important levers of economic advantage:

- First, a "vertical" advantage, as users can leverage the same digital twin template along a product's entire supply chain, encompassing the entire process from raw materials upstream at the start of a supply chain to the end product or service downstream
- Second, a "horizontal" advantage of "reuse" of a product's digital twin for multiple use cases. For instance, a company can initiate a digital twin for PCF tracking, and later augment it for quality management functionalities. The latter allows for the efficient tracing of quality issues from their source downstream into the final product. The strategic utilization of a digital twin in this manner can lead to cost savings on recalls by precisely identifying and selecting only the affected products.

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[1] Professor Chris Schlueter Langdon is SAFe PM-PO certified (link), and in his role with Deutsche Telekom he has been one of three Agile Product Managers responsible for the Catena-X software release made available as free and open-source (FOSS) software under the Eclipse Foundation in the Tractus-X project, link
[2] This was a project by Deutsche Telekom, and Prof. Langdon was the principal investigator and project lead.

Understand deeper from our insights with management importance

- Case studies
  - PCF-Pilot@CES, how to primary scope-3 CO2 data: IBM's 2min [video](#), LinkedIn [posts](#), [research note](#)
  - RealLabHH@ITS: [ITS 2022](#), [Hub.Berlin 2023](#), [Auto 5](#): Mob super-app disruption, [Mob Analytics](#): Show me the money
- Basics
  - [Dataspaces 101](#)
  - [Data products: Digital twins](#)
- Catena-X: [Verein](#); Our events: [Greenville SC 2023](#), [Austin TX 2023](#), [IAA Munich 2023](#)

References

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