

Digital Twins in practice

with Eclipse BaSyx

How companies benefit from Industry 4.0 middleware

Interview with Frank Schnicke, Department Head Digital Twin Engineering at Fraunhofer IESE

A Digital Twin is the virtual representation of systems and processes. It enables virtual tests, shortens development times and thus the time to market for new products. The IESE experts design Digital Twins specifically according to the wishes of their business customers. In this interview, Frank Schnicke explains how the Eclipse BaSyx solution is used.

What are the advantages of Eclipse BaSyx?

The idea behind the Industry 4.0 middleware Eclipse BaSyx is to enable the fast and, above all, cost-effective implementation of standardized Digital Twins – also known as Asset Administration Shell – and their infrastructure. And not just in terms of function, i.e. whether the Digital Twin does what it is supposed to do, but also in terms of non-functional aspects. For example: Is it not only secure but also scalable? We are not talking about several thousand or hundreds of thousands of Digital Twins of individual companies, but we are quickly talking about three-digit millions, if not billions. These figures show the amount of data and Digital Twins that are generated.

In which sectors is BaSyx used?

The main focus of our work with Eclipse BaSyx is clearly production. However, we are also using BaSyx in many other areas, such as Smart City, Smart Grids and Digital Healthcare. In the research projects we carry out here at IESE, we have found that the challenges with Digital Twins are more or less always the same. First of all, I need an infrastructure that – as I mentioned – is securely scalable. Next, I need information about the asset – regardless of the domain.

What makes the solution stand out from the competition?

A major added value of Eclipse BaSyx is that it is open source. This means that anyone who uses it is authorized to make their own modifications. We at Fraunhofer IESE are of course very happy to support companies in this. However, if a company builds something together with us and then wants to make minor modifications afterwards, these adaptations can be

carried out independently. Another important advantage is that you can participate in the further development of the solution. We are constantly updating the software, as are our partners. This means that all users have free access to the latest version of the open source software – without having to invest anything.

How does the process work with customers?

In principle, the question at the beginning of a project is always: Where does the customer stand? In other words, have you already determined where the challenges lie, or do you just have a vague feeling that things are not running smoothly? If this is still unclear, we first hold workshops in which we work out the company's vision – i.e. where the journey with the Digital Twin should take us.

But what is also very important is: what are the intermediate steps and the "low hanging fruit"? In my experience, the implementation of Industry 4.0 is often approached as a big-bang migration. This means that you have an ambitious goal, but it is difficult to achieve. We put great emphasis on taking initial measures that contribute to this ambitious goal, but at the same time guarantee a return on investment at a very early stage.

What is an exemplary use case?

A typical use case of our work is breaking up of data silos. Nowadays, a lot of data exists in data silos. This means that you always have the same data point, but in different repositories. The interesting question now is: How do I deal with this? The Digital Twin can help by introducing standardized interfaces that break down these data silos and create a central point of contact. If the Digital Twin is also standardized, we can also

achieve simplified communication. For example, I buy a new milling machine and then – instead of a gigantic pile of paper – I receive a Digital Twin that presents all the data in an interoperable format, i.e. can be integrated into my own IT systems.

How does Fraunhofer IESE implement the Digital Twin in companies?

Once the right use case has been identified, there are various ways in which we proceed. Typically, we support the customer in enabling them to set up the infrastructure for the Digital Twin. We model relevant data in the Asset Administration Shell – always with a view to the latest research results, of course. We then integrate the Digital Twins into applications, such as dashboards or similar, to make the added value visible.

Are there any specific project examples?

We had a very illustrative project with a company that coats textiles. You have to imagine the process like this: Large rolls of fabric run through machines. A powder is applied, which is then heated with burners. This dyes the fabric. This was a manual process that required many individual work steps by several employees. We carried out a retrofitting together with the company.

This means that we have installed sensors that determine whether the burners are still doing what they are supposed to. We have collected the data in Digital Twins of the machines and displayed it visually in a dashboard. The production manager can now easily see from his office whether the process is still running properly. In contrast to the past, when he still had to walk to the machine, open a flap and look inside the machine. The Digital Twin really makes work easier!

"We put high focus on selecting and implementing the initial measures that contribute to the ambitious goal but still guarantee an early return on invest."



Frank Schnicke
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Digital Twin Engineering



PODCAST TIP
DEEP DIVE

Digital Twins for SMEs – quick and easy to use (German version)