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Service-oriented hub makes sustainability information usable for manufacturing companies

IT Platform Collects Sustainability Data

In the EcoHub research project, researchers from the Fraunhofer Institute for Manufacturing Engineering and Automation IPA have teamed up with partners to develop a service-oriented platform designed to collect and process sustainability data on a centralized basis. The platform makes it easier for manufacturing companies to draft environmental reports and apply for certification.

Sustainability is a key competitive advantage for companies. By lowering greenhouse gas emissions, improving the circularity of products and increasing resource efficiency, these entities can also contribute to a sustainable transformation of industry. In addition, more and more companies are under legal obligations to report on topics such as whether their production operations are carbon-neutral. And yet, preparing the required environmental reports and applying for certification can be laborious and costly. Collecting the sustainability information that measures a company's environmental, social and economic impacts, including energy consumption, greenhouse gas emissions and supply chains, is a hugely time-consuming process. This is because the sustainability data required for this — such as how much electricity or gas certain machines use or the volume of exhaust air that needs to be filtered — has to be extracted from a veritable flood of machine data, an arduous task.

In the EcoHub project, which is receiving funding from the German Federal Ministry of Education and Research (BMBF), researchers from Fraunhofer IPA in Stuttgart teamed up with industry partners from the paper, chemicals, recycling, metalworking, agriculture and food industries to develop a platform for managing sustainability data that handles this very step. The platform collects the data, taking aspects of data security and access authorization into account, in a single centralized location and then presents it in a clear and easily digested format. This store of data in the form of a service-oriented hub allows for further analyses and provides the relevant company with valuable feedback. For example, waste of materials can be identified and energy consumption and pollutant emissions reduced. The measurement data serves as a basis for identifying anomalies and unlocks the possibility of AI-based predictions of anomalies. The data hub is also ideal for services such as life cycle assessment (LCA), material flow cost accounting (MFCA), data validation and reporting. The platform not only analyzes and interprets the machine data but also draws on a company's enterprise resource planning (ERP) system and manufacturing execution system (MES). Required reports are generated in just a few clicks.

Validation through real-world testing

The 17 project partners validated the software in ten cross-industry use cases. At first, only the company's own employees have access to the data. In the long term, however, plans call for companies to be able to share sustainability data between them as well.

"The targeted data management structures and practices used to manage companies' cost-effectiveness and performance are still in their infancy when it comes to sustainability," says project Prof. Jörg Mandel from Fraunhofer IPA. This means the goal should be to provide and manage sustainability data in such a way that it can be used by various management systems. "Established platform solutions for collecting sustainability data don't exist on this scale yet. In most cases, initial approaches to providing sustainability data in a structured format are geared toward individual use cases, so they don't form a platform that spans multiple applications. That's exactly what we're focusing on with our solution," Mandel explains.

The prototype of the IT platform is complete and ready for roll-out. Some of the project partners are already actively using the system. Fraunhofer IPA offers decision-making support to companies that are interested in the new solution as well as strategic assistance with setting up and implementing the software. The software is hosted and licensed by project partner ConAct GmbH. There are plans to release a demo version. In late February 2025, LOG_X Verlag published a book on this subject by Mandel and Prof. Alexander Sauer, institute director at Fraunhofer IPA. It is titled *Nachhaltigkeit managen. Der Eco-Business-Hub für Unternehmen* (Managing Sustainability. The Eco-Business Hub for Enterprises).

Project partners:

Apium Additive Technologies GmbH, Arla Foods Deutschland GmbH, ConAct GmbH, Feindrahtwerk Adolf Edelhoff GmbH & Co. KG, Franz Kessler GmbH, Fraunhofer Institute for Manufacturing Engineering and Automation IPA, Hochwald Foods GmbH, Invisium GmbH, Modular Robotics UG, PNZ-Produkte GmbH, Römerwall Naturbrunnen- und Getränke GmbH & Co. KG, Wilhelm BAHMÜLLER Maschinenbau Präzisionsswerkzeuge GmbH, Wuppertal Institute

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Fig. 1 The IT platform enables the secure collection and centralized processing of data for valuable insights into sustainable production.

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