Digital lab journal – networked processes

LAB 4.0 for Digital Life Science

Digitization – for what?

The use of digitized processes and artificial intelligence (AI) for product development enables knowledge-based new products, processes and applications to be brought from the idea to technological market maturity more efficiently with complex requirements and new materials. Sustainability aspects with regard to raw materials used, energy and water consumption, and design for recycling are integrated from the very beginning. This is made possible by the integral digital linking of material and process know-how using measurement data and algorithmic calculations in a holistic and user-centered overall system.

Fraunhofer ISC offers expertise in materials research, device development and transfer to automated and digital processes for the development of customized solutions from a single source. Software solutions are developed that can be applied in a wide range of scientific disciplines and thus competently implement interfaces from the analog to the digital world.

Fraunhofer ISC's competence profile – in materials research, process and technology development, as well as biomedicine and medical technology – shows that customized, user-friendly digital tools can be developed for a variety of focal areas and application scenarios.

LAB
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The digital lab journal

Hybrid Semantic Knowledge and Data Exchange System, or HyKLESS for short: This refers to a digital collaborative platform with numerous interfaces and individually customizable modules that semantically links the knowledge of a company or research organization. It thus serves as a universally usable repository for knowledge management, for intelligent data archiving and research, for the simplification of laboratory processes and for the AI-based use of existing data for the generation of new materials, technologies and products. While many individual digital solutions already exist for specific problems, the digital lab journal of Fraunhofer ISC, as a central knowledge platform, provides the necessary networking in between – so it becomes an organism rather than a loose association of single cells.

The digital lab journal thus covers all eventualities and user needs without users having to switch between different systems. They can equally manage devices, materials and problems, write freely formulated laboratory book entries and document fixed standard procedures. In addition to the automated transfer of data from the laboratory, the automated triggering of evaluation algorithms is also supported. Internationally standardized vocabularies (ontologies) ensure integrity in scientific exchange.
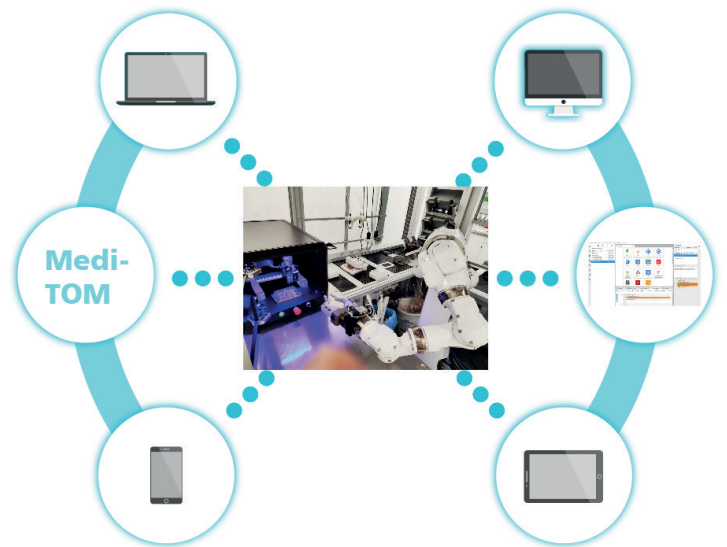
LAB 4.0 for Digital Life Science

Biological systems in particular are sensitive to minor fluctuations in environmental and process parameters. Accurate and complete acquisition of all relevant information is therefore essential for sophisticated and sustainable research and development. Digital, (partially) automated solutions help to maintain an overview even in complex processes and still keep the effort low. The data collected in this way can also be transferred directly to AI processes to benefit additionally from their performance. One example is MediTOM, which was developed by the CeDeD and TLC-RT groups at Fraunhofer ISC. The combination of automated, digitized processes and the HyKLESS platform can thus create uniform data structures that are readily adaptable to individual problems – the basis for complex developments.

Further information

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