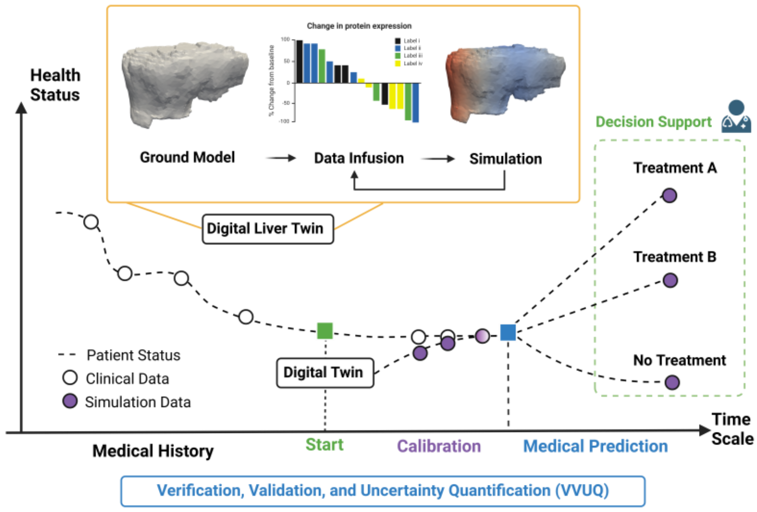
KTH SOLID MECHANICS KEYNOTE SEMINAR; Thursday, April 17th, 16.15; https://kth-se.zoom.us/j/67782161584

Tim Ricken
"The Digital Liver Twin: An AI-Supported Multiscale In Silico Model of Function, Perfusion, and Structure – Opportunities and Challenges"

The digital liver twin is a virtual, AI-supported numerical model that mirrors the human liver's structure, function, and blood flow. Continuously updated with patient-specific data and medical imaging, it enables 'real-time' simulations to predict how lifestyle changes or medical interventions may affect liver health. By digitally replicating not only the liver but also essential interconnected organs—such as the heart, lungs, kidneys, and the circulatory and digestive systems—the model provides a holistic view of physiological interactions. Developed within an interdisciplinary research team, the digital liver twin aims to support clinical decision-making, particularly in complex cases like tumour resections or liver transplants. It reduces uncertainty by simulating potential outcomes tailored to individual patients. At the same time, it empowers patients to better understand the long-term impacts of their lifestyle choices on liver function and overall health.



Ref.: *Sel, K., Hawkins-Daarud, A., Chaudhuri, A. et al. , Digit. Med.* **8**, 40 (2025). https://doi.org/10.1038/s41746-025-01447-y

Tim Ricken is a civil engineer by training (Dipl.-Ing., 1998) and received his PhD in mechanics in 2002. He served as Assistant Professor of Computational Mechanics at the University of Duisburg-Essen before being appointed as Chair of Structural Mechanics and Dynamics at TU Dortmund University (2011–2017). Since 2017, he has been Professor and Director of the Institute of Structural Mechanics and Dynamics in Aerospace Engineering (ISD) at the University of Stuttgart. Prof. Ricken has been the spokesperson of the DFG Priority Programme SPP 2311 on "Continuum Biomechanics" since 2024, and since 2023 he also leads the BMBF joint project ATLAS (AI and Simulation for Tumour Liver Assessment). His research spans a broad spectrum of applications, including biomechanics, metamaterials, and environmental sciences. He focuses on coupled finite element simulations, nonlinear and multiphase problems, and multiscale modelling. Core methodological tools include nonlinear continuum mechanics, thermodynamics, porous media theory, mixture theory, the finite element method, and data-driven simulation approaches. His work contributes to advancing understanding in both engineering materials and complex biological and environmental systems, including processes such as growth, remodelling, and optimization.