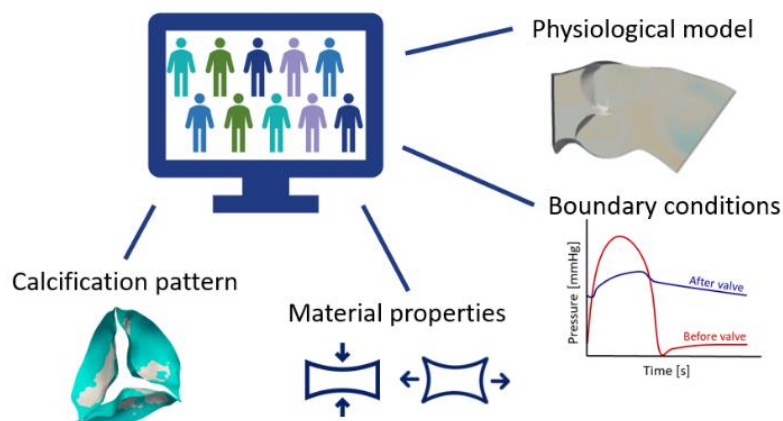


# Frans van de Vosse

## “Computational Cardiovascular Biomechanics: model predictive decision support and how AI sneaks into it”

Given cardiovascular applications, this presentation introduces the digital twin technology concept in the context of model predictive clinical decision support and in-silico clinical trials. The importance and potentials of computational mechanistic models as well as data driven models, and their possible integration in hybrid models will be illustrated using distinctive use cases. The application areas include decision support for treatment and management of patients with, among other things, coronary artery disease, high risk of arrhythmia, heart valve disease, and aortic aneurysms as well as decision support in pre-and neonatal care. In addition, the role of evolving AI approaches including generative AI to develop and facilitate reduced order and surrogate (reduced order) models, data augmentation, synthetic patient generation, sensitivity analysis and uncertainty quantification will be addressed. The importance of data quality (by certification) will be discussed.



Frans van de Vosse is professor of Cardiovascular Biomechanics. Trained as an applied physicist his research initially was focused on experimental and computational fluid dynamics of complex fluids (biofluids, polymers, and fluids in food industry). Gradually, his main research interests are specifically dedicated to the computational and experimental biomechanical analysis of the cardiovascular and respiratory system. Starting from pure physics based computational models, hybrid models, integrating mechanistic physiological and stochastic data driven models, are being developed and applied to monitoring and diagnosis as well as to decision making and intervention in the clinic. To advance the translation of engineering research to the clinic he initiated and cofounded the master program Medical Engineering and the postgraduate School of Medical Physics and Engineering (SMPE/e). He initiated and supervised a number of national and international projects or project work packages on the interface between technological and clinical applications.