IN CONVERSATION WITH **ANDREAS SCHUPPERT**

Key expert, Bayer AG and Professor, Aachen University

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Andreas Schuppert is Professor for Computational Biomedicine at RWTH Aachen University and is founding director of the Joint Research Center for Computational Biomedicine at RWTH Aachen University, which is a private-public open-innovation initiative of Bayer and RWTH Aachen University. Additionally he serves as key expert for industrial mathematics and Computational Biology at Bayer AG. He received his diploma in Physics and his PhD in mathematics from University Stuttgart in 1984 and 1988, respectively. Additionally he has a degree in economics. 1988 he joined corporate research of the former Hoechst AG and 1998 he moved to Bayer AG. In 2007 he became adjunct professor at RWTH Aachen and is today the founding director of the JRC for Computational Biomedicine. His focus is on Big Data and machine learning for translational medicine and prediction of disease progression in acute medicine as well as chronic diseases.

Please describe your current role in your organisation

As a professor at RWTH Aachen University I am the director of the Joint Research Center for Computational Biomedicine (5 professors overall). In my position at Bayer AG (currently 40% appointment) as key expert for industrial mathematics my primary role to consulting of AI applications in real world evidence studies.

Please describe what you are currently working on

My primary focus is the development of AI methods in order to enable predictive models for disease progression in individual patients. Main indications are intensive care (respiratory diseases, sepsis, cancer (primarily special types of myeloid leukemiae) and chronic cardiac diseases. For AI method development, besides a high unmet medical need, data availability and heterogeneity is a crucial topic: Intensive care provides a very good availability of structured monitoring data with tight sampling rates, cancer data analysis is mostly based on –omics data with good availability, nevertheless very high dimensionality providing specific challenges, but less time series, for chronic cardiac disease huge observational data and cohort data are available. Moreover, we explore top notch computational technologies, such as quantum computing, for AI applications in real world patient data analysis.

Why is the development of AI in pharma so important in 2019?

Pharma is suffering from a lack in knowledge on the impact of the huge variety of patient-related parameters on the efficacy and side effects in patients. Due to the huge variety, the effective analysis and learning from big data repositories is unavoidable. It is supported by the rapidly increasing availability of such repositories, as well as new types of data assessed from monitoring of patients with modern sensor technologies. Due to the huge variety of unexplored) effects, AI will play the key role to learn the really relevant impact factors and the respective mechanisms from theses data. Besides identification and characterization of rare diseases, AI is expected to classify patients with respect to unknown subclasses of complex diseases and associate these subclasses with disease driving mechanisms enabling precision medicine. Moreover, recent results indicate that AI methods, such as reinforcement learning, may provide new options to monitor or even improve the impact of therapeutic strategies on patient outcome. Learning new underlying disease driving mechanisms from data, however, which could significantly support pharma R&D strategies, can hardly be done with today's AI technologies, but it is one of the main areas of AI research today.

We hear that you are involved in high-performance computing activities as well. Briefly outline the future opportunities that you think this involves

New computing concepts beyond the established HPC technologies, primarily quantum computing and neuromorphic computing, have the capabilities to speed up the solution of special computational challenges, such as combinatorial optimization, by orders of magnitude. Especially combinatorial optimization is one of the basic computational foundations of most AI algorithms. Hence it is expected that the new computing technologies might have a significant impact on AI applications in chemistry, pharma and patient data analysis.

What you would like to achieve at the PharmaIT & Data Congress in London?

I would like to hear about the most recent trends in this rapidly emerging field and network!