Model-based digital technologies: deploying deep process knowledge to accelerate
decarbonization

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At a time when decarbonization is driving great change in the process industries, the digital revolution is making it possible to significantly accelerate new process development and improve efficiency of operations. Prof. Pantelides describes how state-of-the-art digital design techniques use high-fidelity predictive models (digital process twins) of process physics and chemistry systematically to accelerate innovation and arrive at economically optimal process designs, based on quantified, managed technology risk. A key advance for operations is the ability to deploy such digital process twins to bring deep process knowledge into process operations and control. A new generation of Digital Applications generates value by combining real-time or historic plant data with the knowledge in the models; the wealth of new information generated is used to create additional daily value from the plant via monitoring, soft-sensing, real-time optimization and "what-if" operations decision support.