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Johan Malmqvist obtained his PhD from Chalmers in 1993 and was appointed professor in 2005. His research focuses on development methodologies and IT support for product development (PLM). His current projects investigate methods and tools for development of product-service systems and knowledge-based engineering tools. He is also heavily engaged in the renewal of engineering education. As a dean of education, he is responsible for Chalmers education programmes in mechanical, automation, industrial design engineering as well as the naval programmes. He was one of the co-founders of the Conceive-Design-Implement-Operate Initiative, an international effort that aims to develop a new vision for engineering education. The approach towards engineering education that has been developed by the CDIO Initiative has been adapted by a large number of international universities.

A CDIO Review: Engineering Education for the 21st Century

Engineering education of today faces many challenges, including to prepare future engineers for work in global, multidisciplinary teams; to co-develop scientific knowledge and practical skills; to foster leadership, innovation and entrepreneurship; and to train students to take on societal challenges such as global warming. On the other hand, new pedagogical approaches, e-learning tools and digital engineering tools offer many opportunities for reforming engineering education to meet the demands of the 21st century.

CDIO (Conceive-Design-Implement-Operate) proposes an novel approach for engineering education that starts from the tasks that engineer take on during the product or system lifecycle: they identify customer needs, conceptualize new products, design in detail, code and manufacture, test, plan distribution, follow up use, plan recycling and ultimately retirement of products. CDIO further proposes that engineering education should prepare for taking on a specialist role in one of these phases, but also to be an effective collaborator with other specialists across the product lifecycle and across the globe.

The presentation will take its starting point in outlining the need and rationale for a CDIO-based engineering education, and then move on to discuss the elements that are typical for a CDIO program: a multitude of design-build-test projects, integrated learning of teamwork and communication, simulation-based mathematics education and innovative learning spaces. Many examples will be provided. Finally, an outlook to the future of engineering education will be provided.