

Managing Complexity, October 3rd 2017:

Paul Hilkens: Océ embraces complexity

As hightech systems almost equal complexity, Océ has decided to embrace this complexity as a way to master it. Two approaches stand out: to apply modeling to quantify uncertainty as much as possible and as a way to move towards virtual prototyping. The second aspects is to create as flat an R&D hierarchy as possible to create maximum flexibility and to make the most of each individual's contribution in development.

Océ doesn't produce your average desktop ink-jet printer. The VarioPrint i300, for instance, can print 25,000 brochures per day. It is one of Océ's weapons of choice to conquer a growing share of the worldwide 909 billion dollars worth printing market and to raise the share of digital printing from 14% of that market in 2015 to 18% in 2019.

As with other OEMs such as ASML, Philips Medical or Thermo Fisher/FEI, also for Océ goes that complexity is the very definition of its hightech systems. Complexity is defined by a multitude of known factors and a fair number of known and as yet unknown unknown factors. What further contributes to complexity is an end product meant for a fast developing market and a situation with confusing or conflicting facts and observations. Complexity stands for ambiguity and uncertainty. One thing is sure, says Hilkens: "Just like in politics, complexity cannot be solved by simplicity."



The architect

He proceeds: "The stakes are high regarding the challenge to master complexity. In order for innovation to remain effective, we need architecting to make sense of complexity and modeling to increase understanding of the interconnected influences. Moreover, we need flexibility and learning to be able to adapt, act and develop according to changing circumstances."

The architect in his role as project manager at Océ is responsible for the development of the



product line in time. He is the linking pin between disciplines and is supported by domain architects and subsystem architects. How does this help to master complexity? Hilkens: "The architect has a vision on future product development, brings clarity by clearing up confusions, promotes transparency within the organization and has the resolve to decide on dilemmas."

Integral modeling

For Océ, mastering complexity is also closely connected to attaining the long term goal of integral modeling, eventually resulting in a complete virtual prototype. Such a virtual prototype for instance combines models and simulations of the paper flow, substrate and ink properties and behaviour and data generation.

The substrate flow is already simulated in a kinematic dynamic 3D CAD model. "More and more models are used to replace prototypes", Hilkens says. "And before long, there will be intensive

interplay between prototypes and their virtual twins to reduce the number of prototypes. As to electronics & mechanics as well as software & mechatronics, good models are already available. But in the less predictable fields of user interactions and chemistry & physics, modeling is a lot harder. For instance: model drop formation to predict ink quality proves hard to realize.”

Some people question the emphasis on modeling. Hilkens is convinced it is the only direction to go: “Modeling provides a way to get the most information out of what we do, to sense and to learn, to adapt and to act. It enables capturing knowledge and aiming this knowledge to predict and specify what you need for your product. It allows you to quantify the unknowns and to detect and resolve conflicts while working on a moving target. Models thus help to handle complexity on the human and organizational levels.”

Flat

On the organizational level, Océ has created a very flat hierarchy with only three levels, in which 95% of the staff is an employee who contributes to a project in a defined role. Hilkens: “The bottom line is that employees are the experts who can make their own decisions on content. Everyone's deployment and role can instantly change when the project demands that. A positive attitude is required and everybody's effort is measured in terms of 'result drive' – note the difference with 'result'. In this way, we try as much as possible to prevent our R&D staff from being driven into a fright, fight or freeze mode.”

That is not the same as leaving everyone within his own comfort zone. “Quite the opposite, innovation is the very definition of getting out of your comfort zone. But this needs to be done in a composed manner. That is why we plead for embracing complexity.”



Paul Hilkens is Vice president of R&D at Océ Technologies in Venlo