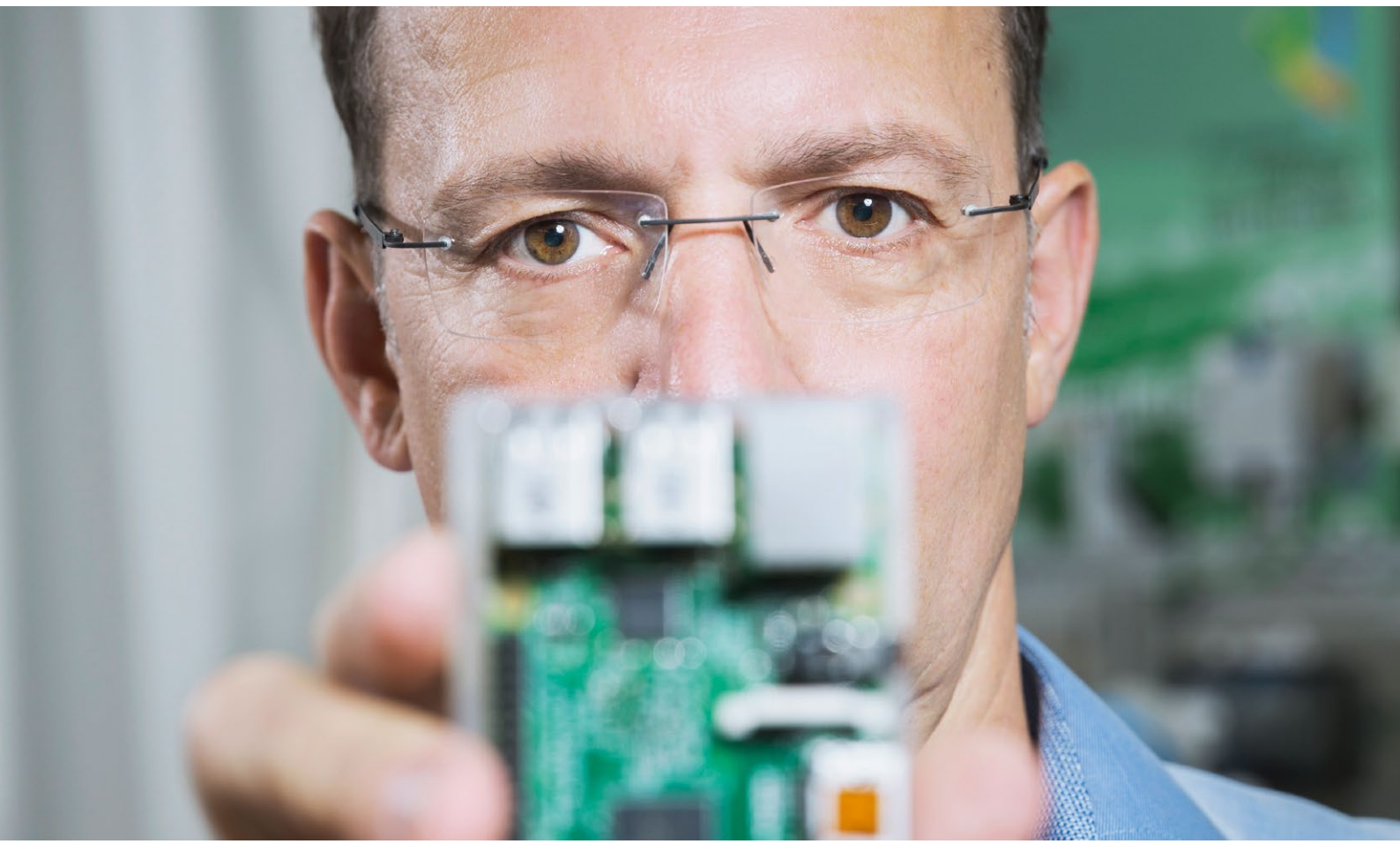
"THERE IS NO PATENTED RECIPE."

The digitalisation of value creation chains is different in every business. That's according to Professor Leon Urbas, Chair of Process Control Engineering and Director of the Process Systems Engineering Working Group at the Dresden University of Technology. We speak to Professor Urbas about "Process Industry 4.0".

Interview: Hans-Peter Bayerl /// Photos: Markus Hintzen



Prof. Urbas, the term Industry 4.0 is on everyone's lips in Germany. What developments have there been at an international level?

Urbas: The term originally comes from a German research project, but is now used to refer generally to the digitalisation of industrial value creation networks. The changes in production and processing caused by information and communication technologies are leading to greater productivity, efficiency and flexibility. At EU level, we have the "Horizon 2020" initiative with the "Factories of the Future" programme. The "Advanced Manufacturing 2.0" initiative in the USA also focuses on re-industrialisation through bringing value creation chains back to the country. China's current annual plan also places great emphasis on automation.

Why are the benefits of this not yet in reach for many businesses?

Urbas: Digitalisation, by which I mean the optimisation and innovation of processes using IT and communication technologies, has a wide range of uses. This

means that Industry 4.0 is not a patented recipe, but rather a tool that can be used to leverage potential in individual sectors. This is different for every company, which makes it difficult to define. We find many similar situations earlier on in industrial history. After the invention of the combustion engine, for example, the established carriage manufacturers were convinced that they were going to be the ones who would build the cars of the future. But the companies who were really successful were those who understood that building a car is something completely different. It's exactly the same in the process industry. There are well-managed and highly customer-focused companies doing well on the market who will only survive in the long term if they keep on top of the disruptive innovations of digitalisation.

For example?

Urbas: Our institute is currently researching modular automation. The benefits in terms of product variability and adaptability have already been proven for low-margin specialisms, even if they have yet to rouse interest for larger scale production facilities. But there is still a lot of evidence that suggests the basic mechanisms, in combination with the corresponding information models from a digital system, can also be transferred to world-scale systems.

So the key question for every company is this: will I still be able to survive in the markets of tomorrow if these are even more volatile and have changed as a result of individualisation, greater flexibility and interconnection? In the automotive industry, the ones who survived were the ones who learned to master their product variety.

Can you put a number on this potential benefit?

Urbas: Unfortunately there is very little in the way of figures, but the potential is becoming obvious in many areas. When large chemicals companies reorganise production due to typical planning and coordination errors, for example, they have to adjust or rebuild their plants before they achieve the desired result. A digital plant can help reduce the workload by around 25 per cent. Some companies are already working flat out to implement this.

Where do you see the biggest hurdles?

Urbas: Small and mid-sized companies do not have the workforce required to both understand and connect automation and information technology. You also have to come to terms with the complexity of the new mechanisms of action. As an educational institution, one of our tasks is to train creative minds for digitalisation. The ever-falling cost of IT and communication technologies is opening up whole new possibilities here.

But I think the greatest obstacle is enabling companies not just to follow rapid technological developments, but to proactively shape them. Organisations that focus only on continuously developing their products and services will inevitably miss this.

Teaching through research: Dresden University of Technology tests process modularisation in its engineering laboratory.

What is the best way to advance digitalisation? With systematic working groups or experimentally?

Urbas: The advantage in having many working groups, especially in Germany, is their thoroughness. Other approaches are more casual but can also deliver important information thanks to a higher hit rate. On the other hand, you cannot force speed in fundamental research. Ideally everything works and expands on existing knowledge, and the winner is the one who earns money with it.

In special products, the trend is towards the mega-factory. How does this fit with modular automation?

Urbas: In digitalisation, we differentiate on a number of levels. These range from the simulation-based, full-system optimisation of conventional plant networks all the way to plug-and-produce designs for quickly creating a continuously operated, process-intensified plant for a certain product that may be produced in that plant for half a year. Industrial parks represent another level, where molecular value creation chains are spread out over a number of sites. Here, too, digitalisation can help better coordinate processes and accelerate product development. There are still question marks over who makes the respective decisions, as well as the future allocation of roles between humans and computers.

What are the typical projects that we will see in the next five years?

Urbas: There are already early adopters founding new industry branches, such as in the production of reactor modules for biotechnical processes as an element between process control and reactor design. We are also seeing pilot projects at both large and small companies focusing on the potential of future automation architectures, integrated engineering and the digital plant.

What do solutions partners like BARTEC need to do in the era of Industry 4.0?

Urbas: They have to deal with the disruptive potential of information and communication technologies, particularly as these become more mainstream. Beyond this, it will be important to enter into innovation partnerships with users, in order to give them the best possible support in achieving their future goals. ///