

The background is a night-time photograph of a city, likely Aachen, with its lights reflecting on the water. Overlaid on this are several digital elements: vertical columns of binary code (0s and 1s) on the left and right sides, and several large, light-blue concentric circles of varying sizes. Each circle is connected to the city below by a thin vertical line, suggesting a network or data flow. In the bottom right corner, a hand holds a tablet displaying a diagram of the 'Internet of Production' concept.

Cluster of Excellence: Internet of Production

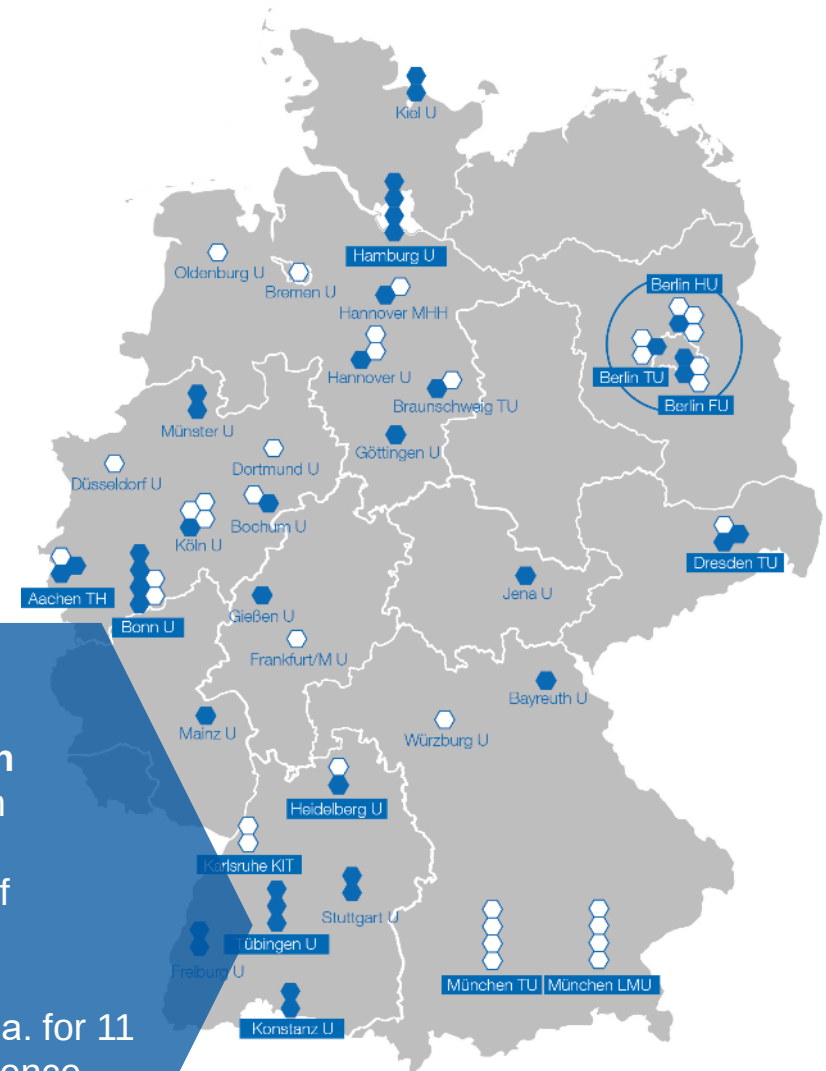
Roadmap of RWTH Aachen for Digitalization in Production

Melanie Buchsbaum | Managing Director | RWTH Aachen

Factsheet EXC 2023 „Internet of Production“

- Overall Funding Sum
~ 50 Mio €
- Over 35 Institutions at Aachen
- Over 200 Scientists involved
- Only Cluster in the area of
Production Engineering in
Germany

Excellence Strategy Germany



Factsheet EXC Allgemein

- Overall Funding Sum
~ 385 Mio € p.a.
- 57 funded Clusters of
Excellence from 34
Universities
- Another 148 Mio € p.a. for 11
Universities of Excellence



Research Objectives

World Wide Lab

Digital Shadow

Agile Production

Internet of Production

Which is the most economic process chain?

Production Development Usage More

www.cenit.com
[Digital manufacturing: Importance of end-to-end processes](#)
05.03.2020 — The term experience **economy** sounds **very** modern, but it actually dates ... The goal must be to examine the overall **process chain** and find a ...

link.springer.com › ...
[Process Chain Design | SpringerLink](#)
20.02.2019 — The purpose of mounting manufacturing **process chains** is the **economic** manufacturing of high-quality products with **greatest** possible ...

link.springer.com › chapter
[Development of manufacturing process chains considering ...](#)
15.09.2011 — **Process chains** are developed with regard to cost efficiency for a ... Competitiveness and **Economic** Sustainability pp 111-116 | Cite as ...

www.pzh.uni-hannover.de › pzh-ifw › publications › 2...
[Simulation-based dimensioning of manufacturing process ...](#)
chain can be found. The basic assumption is that a holistically optimised **process chain** will be **more efficient** compared to individual optimised processes, as the ...

www.sciencedirect.com › article › pii
[Evaluation of Resource Efficient Process Chains for Primary ...](#)
Primary manufacturing **process** steps entail the shaping, moulding,



Machine Tool

Higher load on components could lead to higher maintenance intervals



Tool Life

Change of cutting forces induce earlier tool breakage

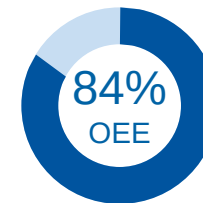


Product Quality

Higher thermal loads can significantly alter product quality

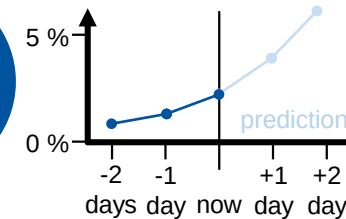
Workpiece Material: EN AW-7075

$C_{pk} = 1.18$

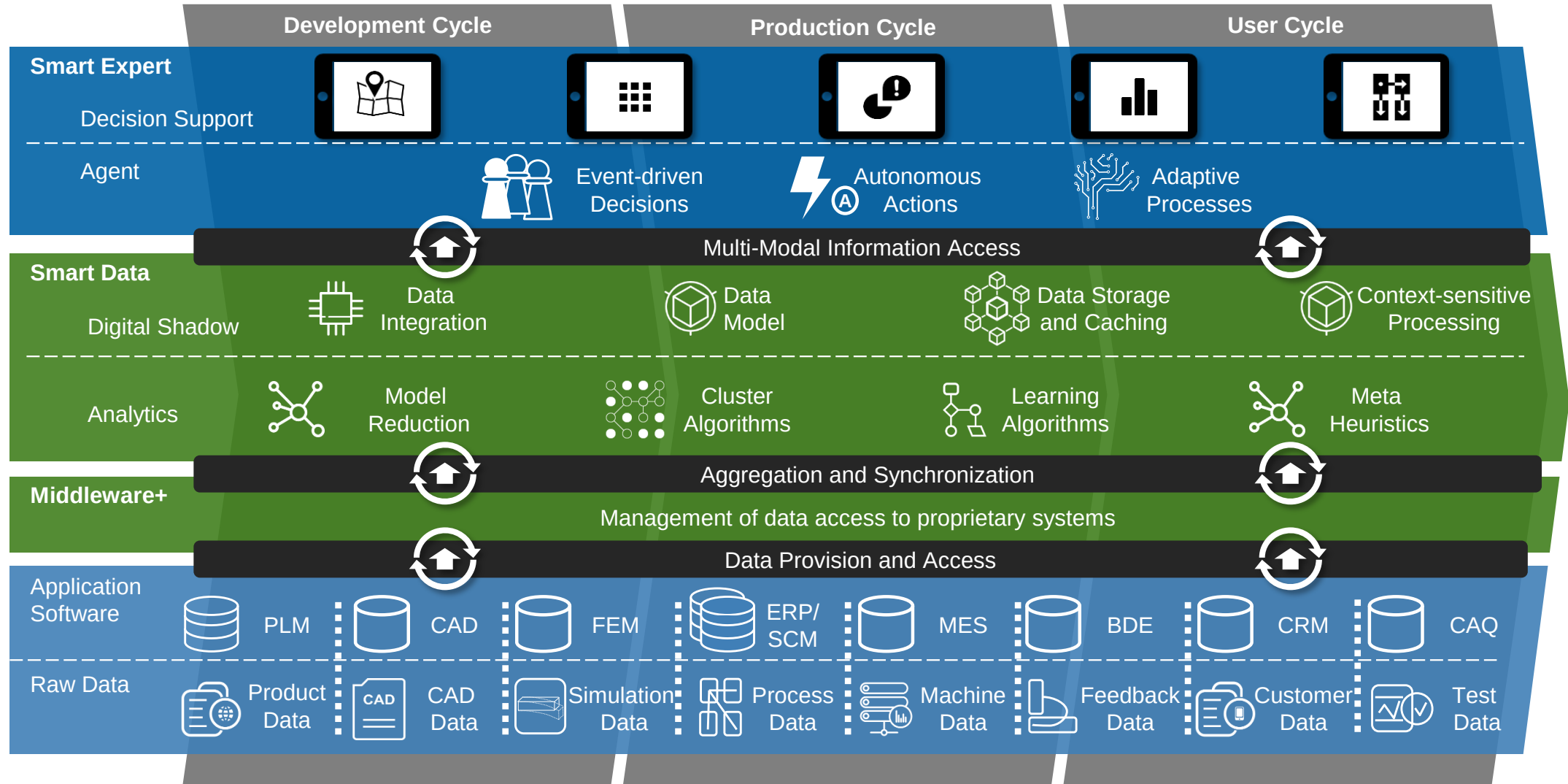


Quality Monitor

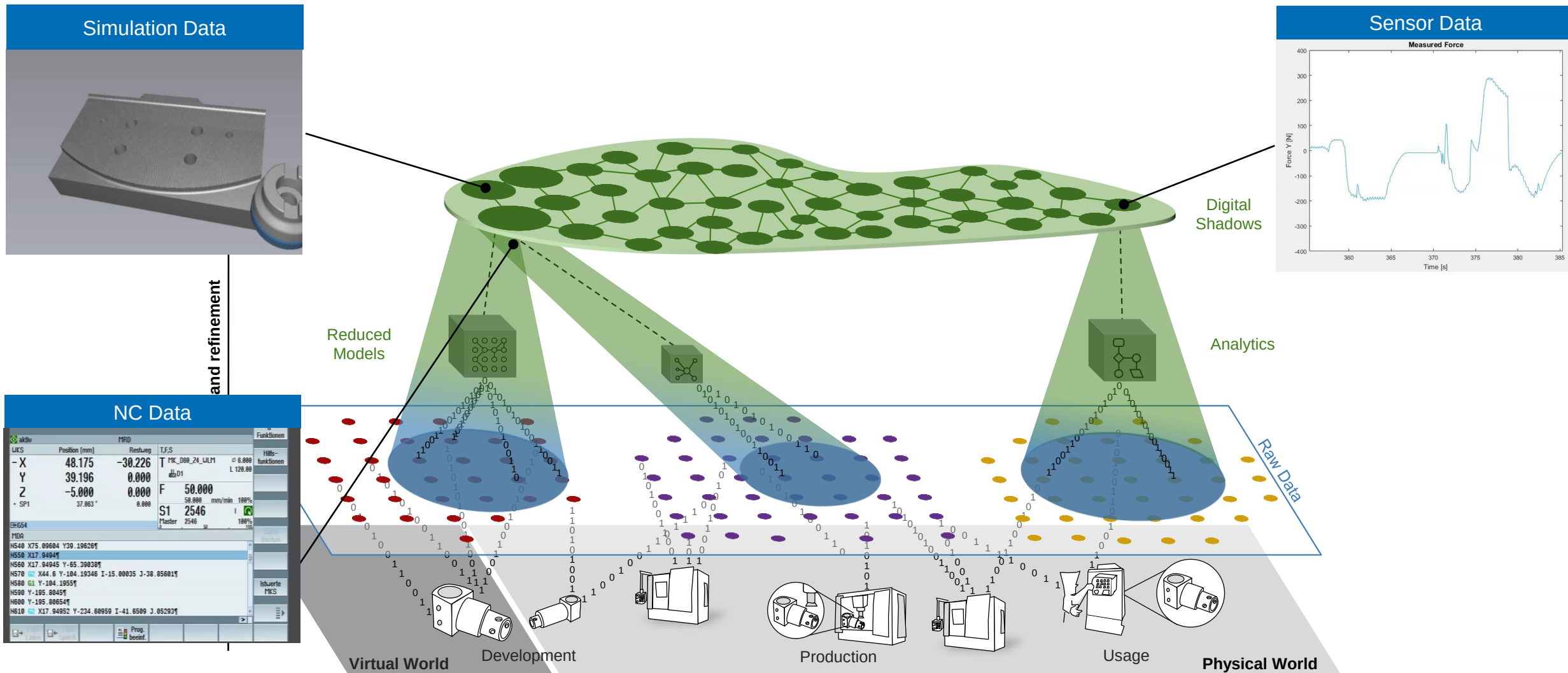
Scrap rate



Central Infrastructural Approach | Infrastructure of the Internet of Production

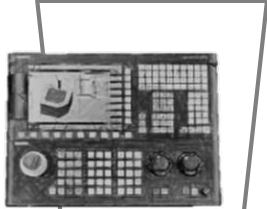


Scientific Approach of EXC | Digital Shadows

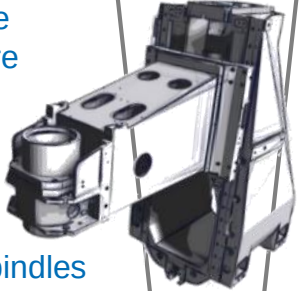


Digital Shadow | Virtual Shadow of Part

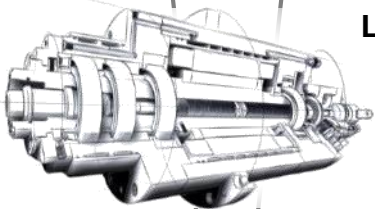
Numerical
Control



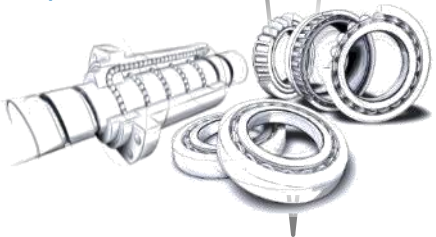
Machine
Structure



Main Spindles
Feed Axes



Components



Domain-Know How

CAD-CAM-NC Technology

- CAD/CAM Planning
- NC Data Trace
- Control Parameter Optimization

Machine Structure

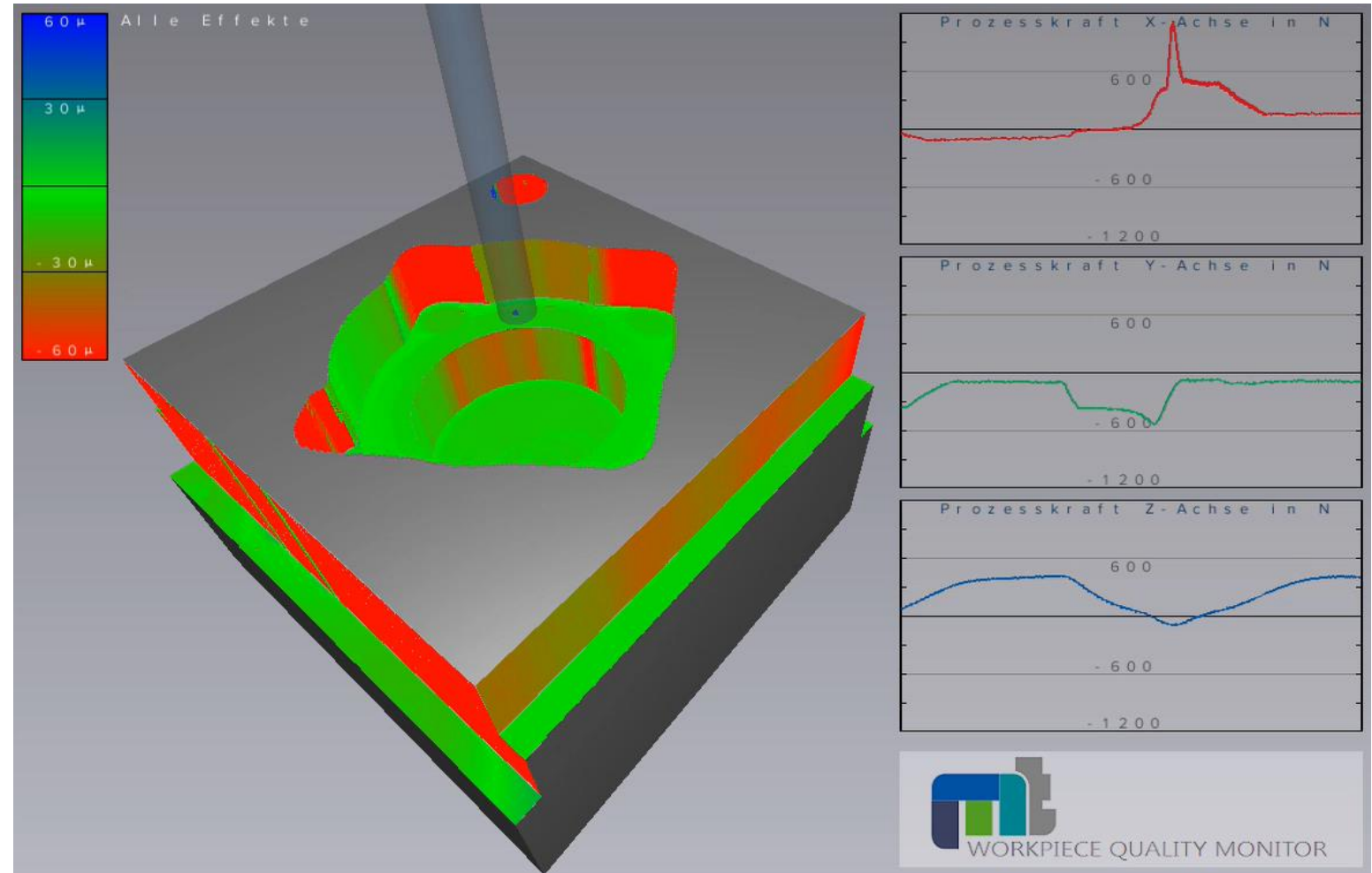
- Dynamical Behavior
- Thermal Behavior
- Geometry

Main Spindle / Linear Axes

- Main Spindle Dynamics and Thermal Behavior
- Feed Axis Dynamics

Bearings / Ball Screw Drives

- Lubrication
- Component Wear
- Ball Screw Friction





source: Google Maps

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|-----------------------------|--------------------------|-------------------|-------------------------|--------------|------------------------|
| 1 AZL | 6 Cluster Smart Logistik | 11 Fraunhofer ILT | 16 „Bogenhalle“, WZL | 21 IEHK Labs | 26 IGMR Labs |
| 2 Ramp-Up Factory | 7 Smart Automation Lab | 12 DPP | 17 Cybernetics Lab, IMA | 22 IMSE Labs | 27 Cluster Photonics |
| 3 M.A.R.S, WZL | 8 MWH, WZL | 13 IKV Labs | 18 Rotter Bruch, WZL | 23 IAW Labs | 28 IT Center |
| 4 IRT Labs | 9 ITA Labs & DCC | 14 ZMB | 19 IBF Labs | 24 ISF Labs | 29 Computer Sci.Center |
| 5 CNC ³ , WZL-WM | 10 Fraunhofer IPT | 15 IOT Labs | 20 GI Labs | 25 IWM Labs | 30 Fraunhofer FIT |



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9



20



21

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- 2 Ramp-Up Factory
- 3 M.A.R.S, WZL
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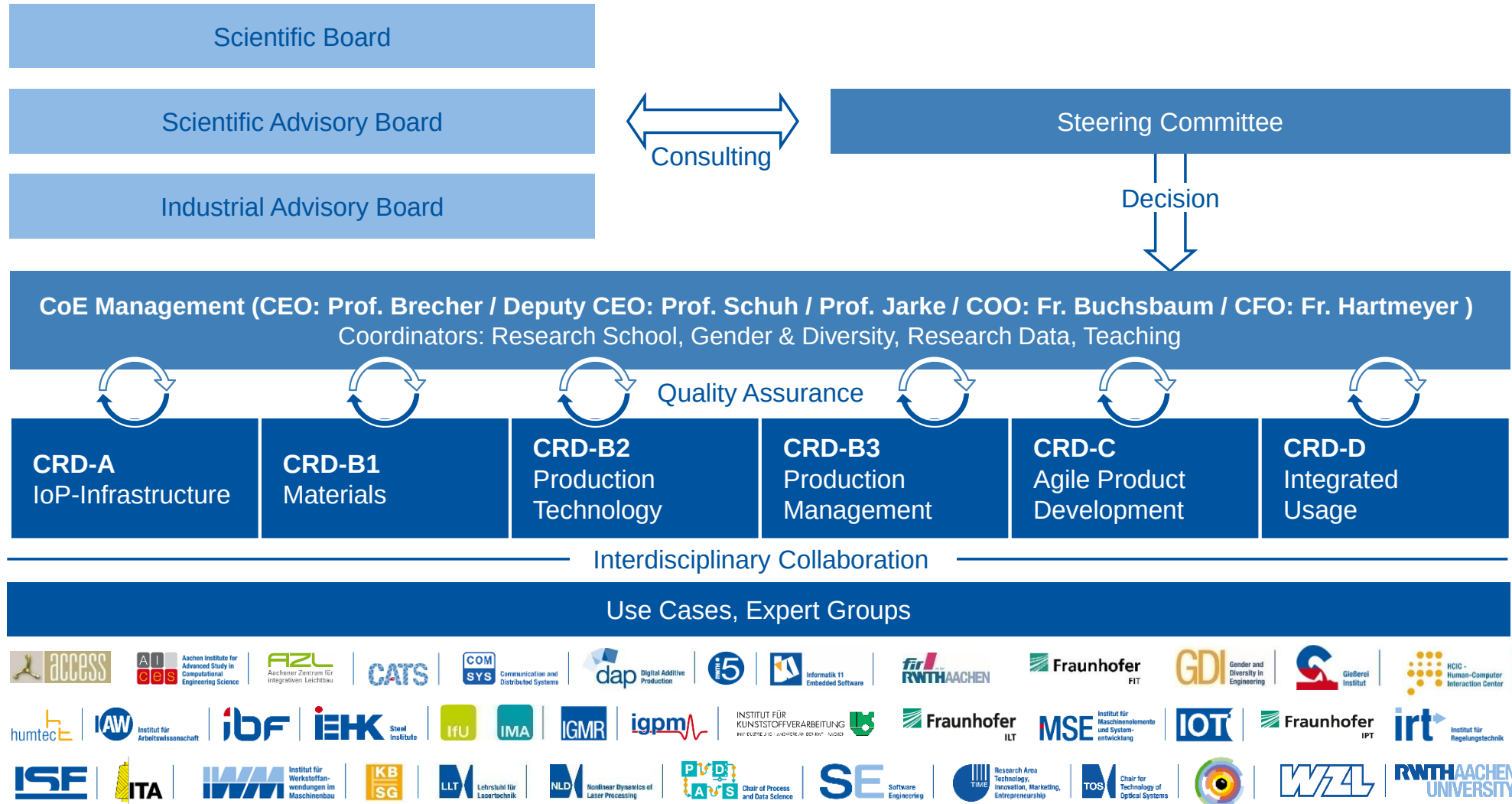
- 11 Fraunhofer IPT
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- 30 Fraunhofer FIT

Cluster of Excellence | Organization Structure



Researchers of the Cluster



Industrial Advisory Board | Members



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