

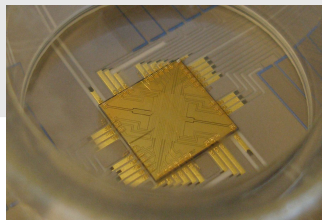
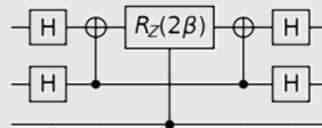
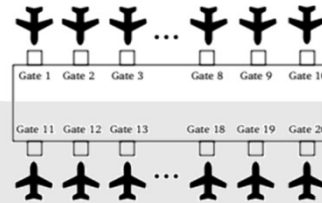
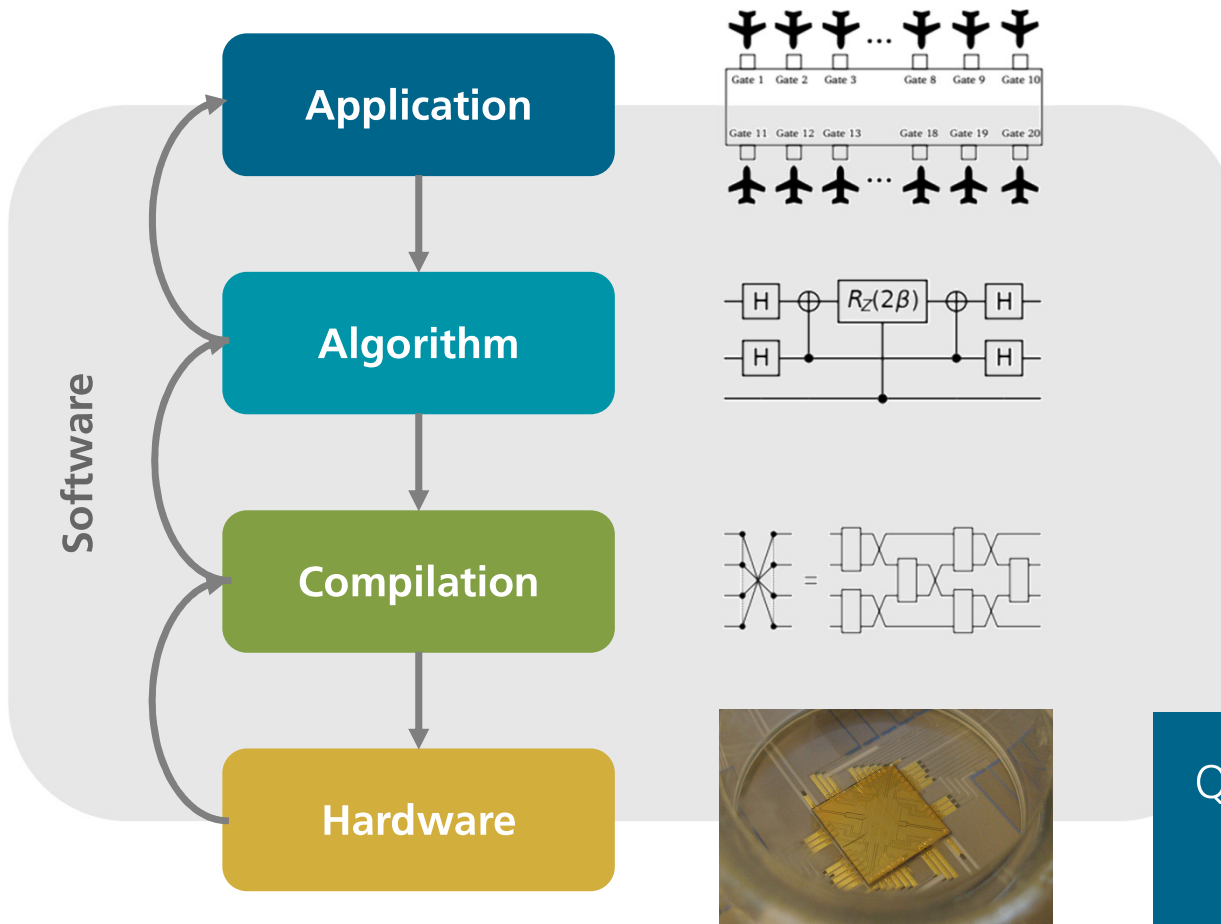
QUANTUM-SOFTWARE-STACK – FROM APPLICATION TO HARDWARE

Peter Schuhmacher

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QC-Software-Stack: Performance by Co-Design

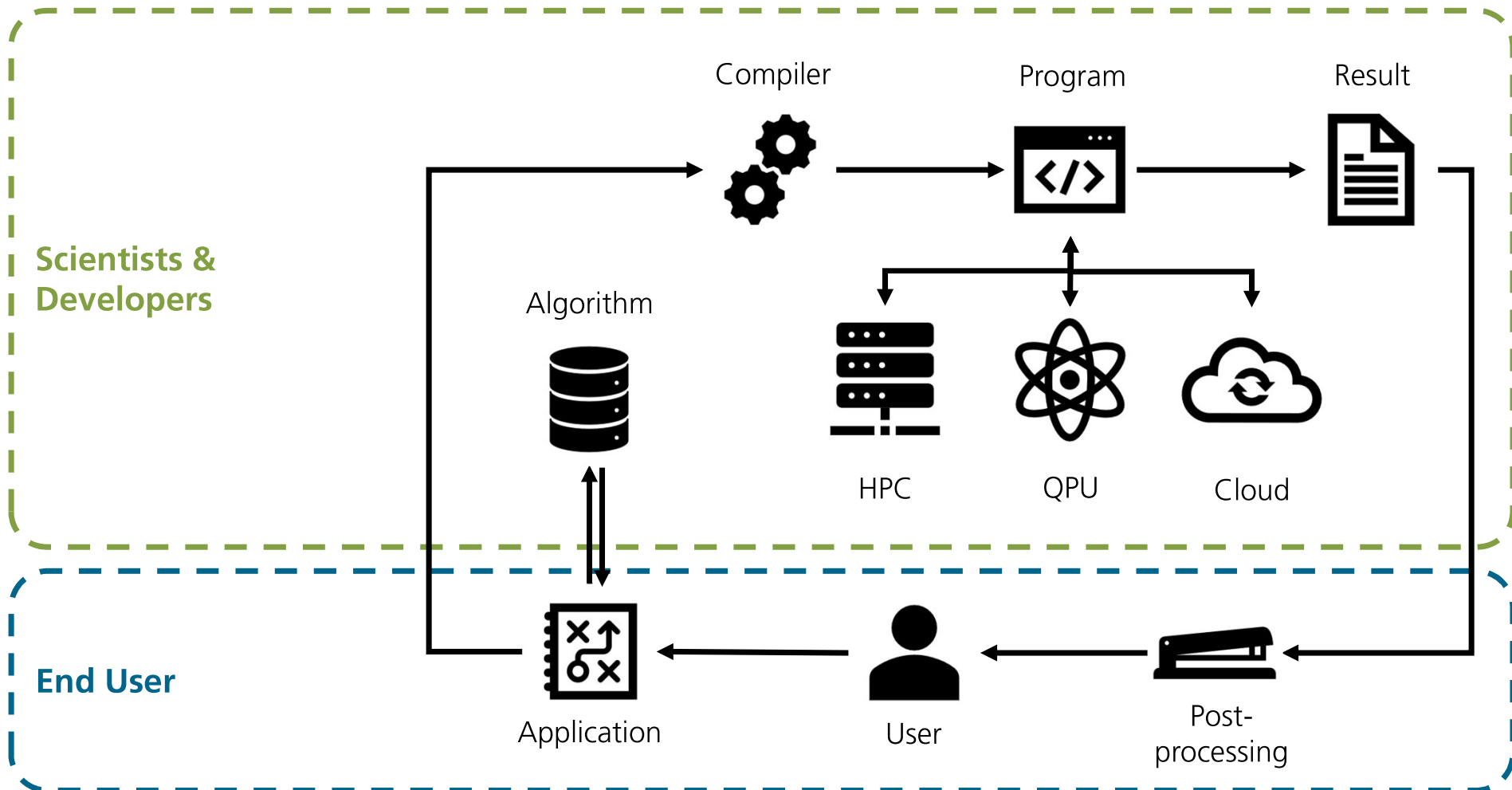


Fotografie des Ionenfallen-Chips
Quelle: eleQtron

- Hardware-limitations need to be considered in any level of the software stack.
- (Industrial) applications need to be explored in harmony to current and foreseeable hardware development

Quantum advantage can only be achieved, if any level of the QC software stack is of **high-performance!**

Vision: User Experience

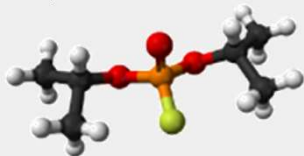


Performant Quantum-Software-Stack



Applications

- Smart decomposition into classical and quantum parts
- What applications are well suited: quantum simulation & optimisation



Platform

- Orchestration
- Communication between HPC and QC
- Real-time requirements



Compilation

- Short circuits and hybrid Co-Optimisation
- (Classical) Runtime-optimisation of the compilers
- Optimal embedding for limited connectivity



Analysis

- Benchmarking
- Analysis and visualisation of the results
- Understanding quantum advantage

