CLIQUE
Classical Integration of Quantum Computers

We provide the technical infrastructure for accessing the DLR QCI quantum computers and embed it in a development environment that offers a low-threshold entry point for running quantum algorithms on real and simulated hardware.

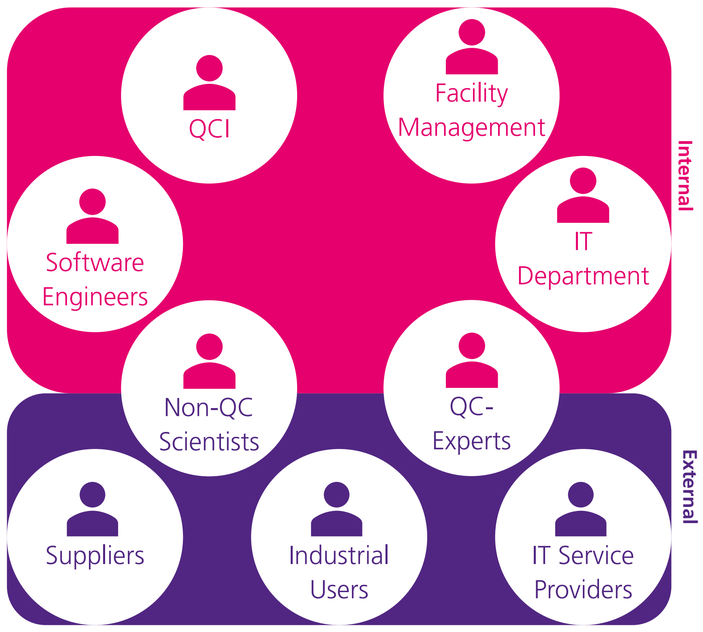
- Application
- Software Engineering
- Networking

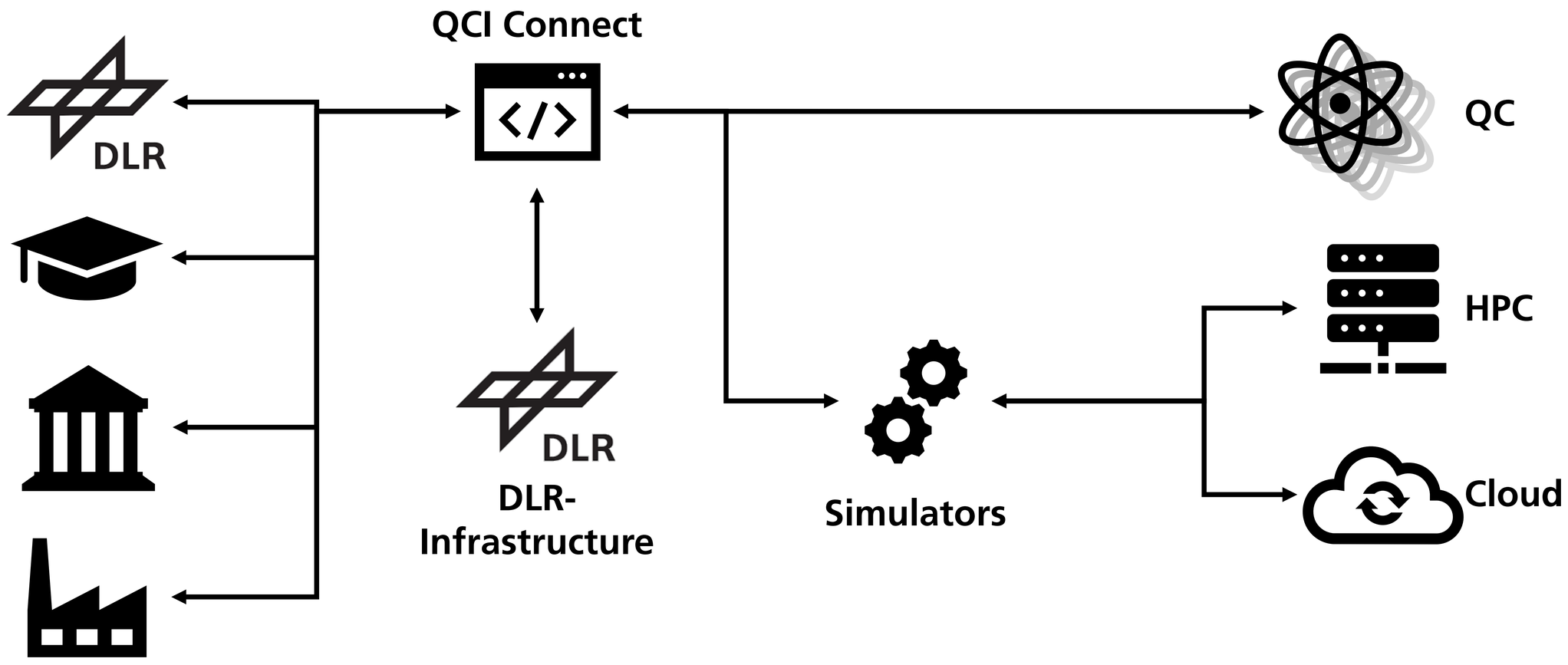
Problem Statement

DLR procures quantum computers to support the development of a quantum computing ecosystem in Germany. The quantum computers themselves are, however, only one part of this ecosystem. In addition, a number of classical building blocks are needed to provide a benefit to academia, industry, and the public sector. The goal of CLIQUE is to identify relevant building blocks and to combine them into a consistent, usable, and beneficial quantum computing ecosystem.

Stakeholder

To develop a system that optimally satisfies the requirements of interested parties, we first require an overview over all roles involved in the conception, development, setup, and operation of the system. We have elicited nine different user roles that are held by persons at DLR (e.g., QCI, facility management, and the internal IT department), by external persons (e.g., the suppliers of quantum computers or DLR's contracted IT service providers), or by persons within or without DLR (e.g., scientists that want to use the quantum hardware to solve domain-specific problems). Moreover, we have elicited 28 requirements provided by these stakeholders that govern the development of our concepts.

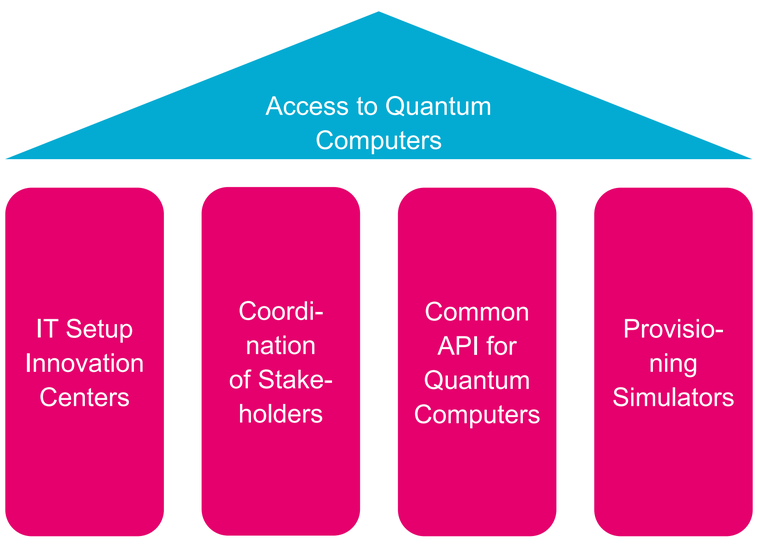




Work Packages

The main goal of CLIQUE is to provide straightforward and easy-to-use access to DLR's quantum computers for all identified stakeholders. For this, we identified the following four work areas:

- The innovation centers in Ulm and Hamburg were new DLR sites with only very basic networking access. Together with DLR's internal IT providers we **set up physical and virtual network infrastructure** that allows easy access while insulating the quantum computers from DLR's intranet.
- The identified stakeholders have competing and partially incompatible requirements towards the quantum computers (e.g., security vs. usability). We regularly **align the requirements of all stakeholders** and communicate the resulting concepts among all interested parties.



- One aim of the QCI is to provide researchers with a diverse set of hardware platforms to develop and evaluate quantum algorithms. To simplify this development, we work with industrial partners and external committees to **develop a universal API for arbitrary quantum computers**.
- Quantum computers are not yet available as off-the-shelf hardware platforms, but are instead active research projects. To provide researchers with an initial stable platform to develop against, we work with DLR's HPC operators to **provide quantum simulators to researchers**.

More information on this project is available on our website.

A project of

DLR Institute of Software Technology

DLR Institute of Software Methods for Product Virtualization

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Get in touch.
We enable quantum!

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