

**Goal6** Realization of a fault-tolerant universal quantum computer that will revolutionize economy, industry, and security by 2050.

# Research and Development of Theory and Software for Fault-tolerant Quantum Computers

**Project manager**

**KOASHI Masato**

Professor, Graduate School of Engineering, the University of Tokyo



**leader's institution**

Univ. of Tokyo

**R&D institutions**

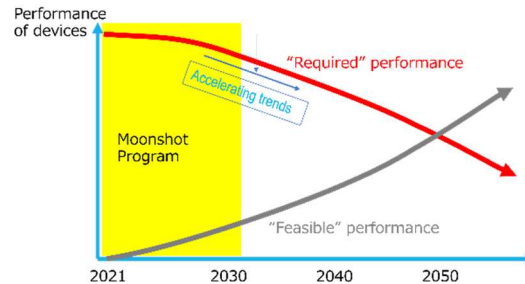
NTT, U of Tokyo, U of Tsukuba, TMDU, RIKEN, Osaka U, OIST, Keio U, Kyoto U, UEC, AIST

**Summary of the project**

This project aims to construct a co-design model encompassing qubit design, fault-tolerant architecture, and compilers and programming languages for efficient computation through collaborations of researchers in quantum information, architecture, and specific physical systems, thereby endeavoring to realize a large-scale quantum computer by the year 2050.

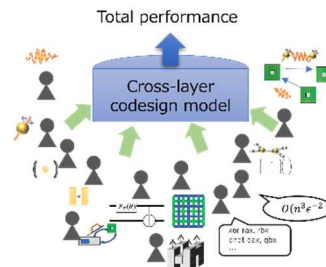
**Milestone by year 2030**

We will deliver a significant reduction in hardware requirements for realizing a large-scale fault-tolerant quantum computer.

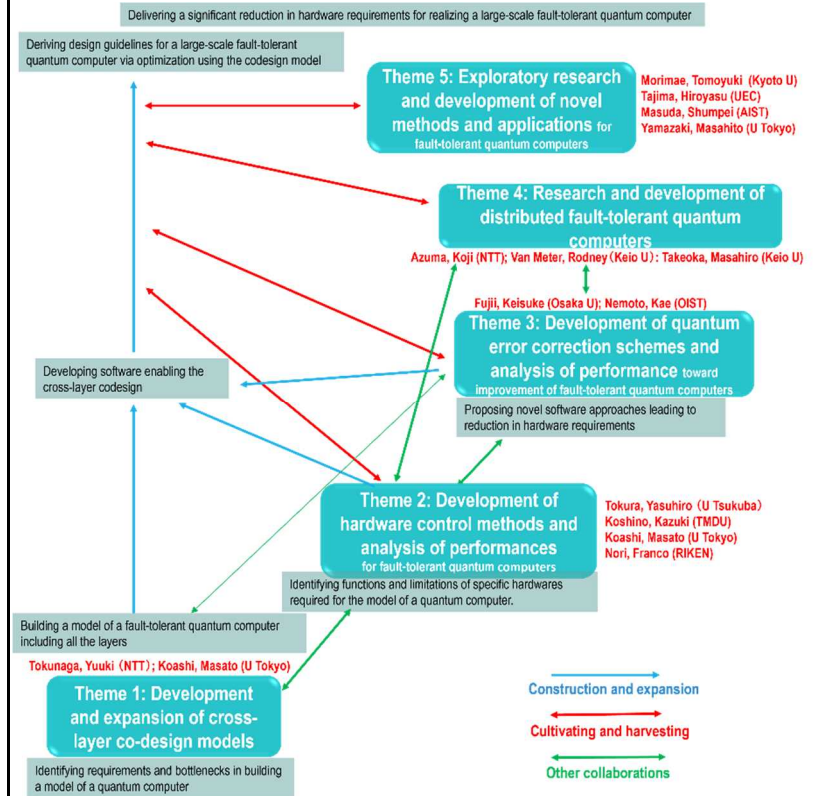


**Milestone by year 2025**

We will develop a supporting tool for designing a fault-tolerant quantum computer with integration of hardware and software.



**R&D theme structure of the project**



To expedite the theoretical research, the project members of the R&D institutes are collaborating with each other beyond the assigned themes shown above and tackling the problems with their open minds