

WARA Quantum Computing

Project Handbook

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Introduction

This handbook serves as a guide for how projects should be structured, managed, and monitored within **WACQT Research Arena (WARA) Quantum Computing**. Its primary purpose is to establish a shared understanding of how projects are executed within the arena

Project Lifecycle

The WARA project model follows a standard lifecycle structure comprised of distinct phases and decision points, as illustrated in *Figure 1*.

Notably, the **Problem Description** and **Post Project** phases are not part of the project itself – they describe, respectively, the selection and decision-making process that precede the decision to initiate a project, and how to follow up on the impact once a project is complete.

The project itself consists of three phases: Planning, Execution, and Closure. The Planning phase starts once the industry partner signs the Letter of Commitment and concludes when the Project Plan is approved and the Project Agreement is signed.

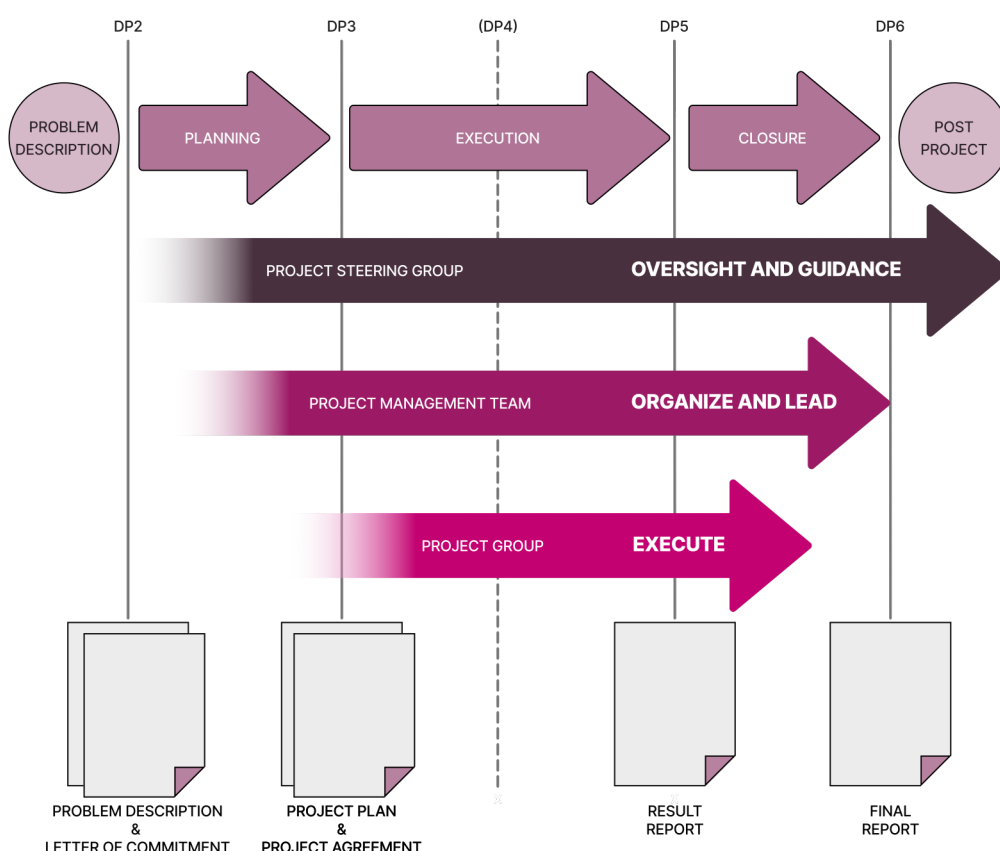


Figure 1 The phases of the project model with decision points and steering documents. The figure also illustrates the organizational structure and their involvement.

Problem Description

Before a project can be initiated, a clear problem description from the interested industry partner is required. This document, the **Problem Description**, forms the basis for WARA's assessment.

Structure of the Problem Description

The company wishing to apply quantum computing to a business case must submit a document addressing the following:

- **Business need and use-case:** Give a high-level description of the specific business problem. What is the value of solving this problem?
- **Computational bottleneck:** Identified why current methods are insufficient. Where does the limitation lie? (e.g., computational time, insufficient memory, energy consumption).
- **Current state of the art:** Account for the current best *classical* method the company uses or knows of. This is important in order to compare and evaluate potential quantum advantage.
- **Resources and commitment:** An indication of the type of domain knowledge and in-kind contribution the company can provide.

Selection Process and Initial Assessment

When a problem description document is received by WARA Quantum Computing, it undergoes an initial review by the **WARA Quantum Computing Steering Committee**.

Selection Criteria

To prioritize the right projects among submitted proposals, the following criteria are used:

- **Scientific and technical depth:** Does the project contribute to raising competence within the Swedish quantum ecosystem?
- **Benchmarking potential:** Is there a clear classical baseline to compare against?
- **Resource availability:** Is there available expertise (WARA staff) and hardware time?
- **Business value:** The potential for industrial impact.

Decision Point (DP1): After assessment, the **WARA Quantum Computing Steering Committee** decides to either approve the proposal, request supplementation, or reject it with justification.

Project Phases

Following the initial assessment and approval of the **Problem Description** by the WARA Quantum Computing Steering Committee, a project can be initiated.

Planning

Once the Problem Description is approved (DP1), the industry partner signs the Letter of Commitment, a project organization should be formed (more on this under organization), and the project moves into the Planning phase.

LETTER OF COMMITMENT

The industry partner formally declares its engagement for the **Planning Phase** through a Letter of Commitment. By signing, the partner commits to contributing the in-kind resources reasonably required to support the planning activities, on a 50/50 basis with WARA for the Planning phase.

A **Letter of Commitment Template** is provided in [A1. Letter of Commitment Template](#).

ORGANIZATION

Each project role within the project's temporary organization should be unique and have a clearly defined responsibility and authority, as shared responsibility can create uncertainty, which can lead to important tasks being forgotten.

The project organization consists of three types of roles:

1. A **Project Steering Group**, composed of a senior industry representative and members of the WARA Quantum Computing steering committee. Their responsibility is to provide oversight and strategic guidance for the duration of the work, and to follow up on the long-term outcome of the project. Their involvement stretches from the start of the project into the impact phase (Post Project).
2. A **Project Management Team**, ideally consisting of one WARA staff member and one industry representative, who's responsible for organizing resources, plan activities, and follow up on results throughout the project phases (Initiation to Closure).
3. A **Project Group** (WARA staff, WACQT researchers, Industry representatives) responsible for carrying out day to day tasks primarily during the Planning and Execution phase.

Note that individuals may hold roles in multiple groups, for example, a person can be part of both the Project Steering Group and the Project Management Team.

THE PROJECT PLAN

During Planning, the arena staff work together with the industry representative to articulate the business problem and clarify where classical computation is the limiting

factor. This can, for example, be done as part of a workshop. The primary output of this work is the **Project Plan**, which serves both as the roadmap for the Execution phase and as the document on which the partner enters into the **Project Agreement**.

The **Project Plan** should include the following chapters:

- **Summary:** Give a summary of the project. Briefly explain what problem the project tackles, the approach taken, and the intended outcome.
- **Background:** This chapter describes the background to the issue being investigated. That is, a brief description of the company's problem and its importance.
- **Aim:** Give a brief description of the project and its intended outcome. State the aim as one or more concrete, verifiable objectives. Where possible, express the aim in measurable terms, for example a target accuracy, runtime, or problem size relative to the classical baseline.
- **Prior work:** What has been done in the field previously. Summarize the relevant literature and any published quantum approaches to comparable problems, together with the classical state of the art identified in the Problem Description. Note which results can be reused directly and where the project needs to break new ground.
- **Delimitations:** This section should explain which issues are not addressed in this project. State explicitly what falls outside the scope, for example problem variants, data sets, or hardware platforms.
- **Work packages:** How the work is structured. Divide the work into work packages, each with a defined objective, a responsible role, an expected result, and any dependencies on other packages. The work packages form the basis for the schedule and for follow-up at the decision points.
- **Resource requirements:** Estimate of hardware time and compute resources required. Specify which classical or quantum hardware or simulators are intended to be used, the approximate hardware and compute time needed per work package, and any software, licenses, or data access required from either party.
- **Organization & In-kind contribution:** The names of the people partaking in the project's temporary organization: the Project Steering Group, the Project Management Team, and the Project Group. An estimate of the in-kind contribution for the Execution phase, supporting the 50/50 co-funding arrangement. For each named individual, state the role, the organization, and the estimated time commitment, so that the in-kind contribution can be followed up during Execution and reported at Closure.
- **Risks:** Potential risks and mitigations. List the technical and organizational risks that could prevent the aim from being met, for example noise levels, circuit depth, qubit scaling, data availability. For each risk, give an assessment of

likelihood and impact together with a planned mitigation or alternative approach.

- **Schedule:** The schedule for the work carried out during the Execution Phase, in the form of a Gantt chart (flow chart). The chart should show the work packages, their durations and dependencies.
- **Deliverables:** List each expected deliverable of the project, the work package it originates from, and the responsible role. The Result Report is always a deliverable; state in addition whether source code, documentation, data sets, or benchmarking scripts are to be handed over at Closure.

PROJECT AGREEMENT

With the Project Plan consolidated, the parties formalize their legal relationship through the **Project Agreement** (*not included in this handbook*). The Project Agreement regulates IP, deliverables, and publication rights, and confirms the full 50/50 co-funding arrangement for the Execution phase, building on the in-kind commitment made for the Planning phase. Signing of the Project Agreement marks the formal transition from Planning to Execution.

Decision Point (DP2): The **Project Plan** is reviewed by the **Project Steering Group** that either approves it, rejects it with modification, or rejects it with justification. Upon approval, the Project Agreement is signed with the Project Plan attached as an amendment.

Execution

Once the Planning phase is complete, the team begins by executing it, typically starting by establishing classical benchmarks, translating the classical problem into a quantum formulation, design an algorithm and executing it on either real quantum hardware or simulators.

The data is then analyzed and compared against the classical baseline to assess performance. Throughout this process, the Project Management Team tracks progress and monitors in-kind reporting.

Given the experimental nature of the field, if a method fails, for instance, due to noise or bad circuit depth or qubit scaling, the team can formally decide to change strategy rather than forcing a dead-end path.

The results are then consolidated into a **Result Report**. This document serves as the primary technical deliverable of the project. It should follow the structure of a typical research paper, which includes an abstract, introduction, methodology, results, and discussion or conclusion.

Decision Point (DP3 – Optional): The **Project Steering Group** reviews the **preliminary results**.

Decision Point (DP4): The **Project Steering Group** reviews the **Result Report** and decides to either approve it, or request modification.

Closure

The project is concluded by a final handover, where the result report and, possibly, source code, documentation, and datasets, are handed over to the industry partner. The Project Team then presents the results to the stakeholders, highlighting both successful outcomes and technical limitations found during the study.

The Project is finally dismissed after approving the Project Closure document. The Project Closure document ensures all deliverables, including source code and the Result Report, have been handed over and that in-kind contributions are reported correctly and approved.

A **Project Closure Template** is provided in *A2. Project Closure Template*.

Decision Point (DP5): The **Project Steering Group** reviews the **Project Closure** document. Upon approval, the Project Steering Group formally discharges the project organization, marking the official end to the project.

Post Project

The project lifecycle extends beyond the Project Closure into the Post Project phase, ensuring the long-term benefits are realized. The Project Steering Group conducts a follow-up review 6-12 months after the project finishes to assess the created benefits of the project. This review investigates whether the project led to any follow-up applications, PhD/Postdoc sponsorships, changes in the R&D roadmap. Additionally, if a scientific article was the result of the project, the number of citations and conference presentations are also reported as a measure of academic impact.

Decision Points

Decision Point		Type of Decision	Decision Support
DP1	Problem Description	Approval to initiate a project	Problem Description
DP2	Planning	Approval of the Project plan	Project Plan & Project Agreement

DP3 (Optional)	Execution	Continue the project according to plan or change the project	Preliminary Results
DP4	Execution	Approval of the Result report	Result Report
DP5	Closure	Decide to officially end the project	Project Closure

Governance Documents

List of governance documents

- **Problem Description** – The proposal describing the business use-case and technical challenge.
- **Letter of Commitment** – The industry partner's declaration of engagement for the Planning phase.
- **Project Plan** – The founding document of the project, that contain background information about the project and a detailed roadmap for project execution. Attached to the Project Agreement as an amendment.
- **Project Agreement** – The legal contract regulating the relationship between the parties.
- **Result Report** – The technical deliverable of the project.
- **Project Closure** – The formal ending of the project.

Appendix

A1. Letter of Commitment Template

GENERAL INFORMATION	
Industrial party	
Org. Number	
FORMAL DECLARATION	
This letter serves as a formal declaration of [Industrial Party]'s engagement in WARA Quantum Computing. We are committed to collaborating on the planning of the project title [Project Name] ("the Project"), granted by the WARA Quantum Computing Steering Committee in a decision on [date].	
IN-KIND CONTRIBUTION	
We undertake to provide in-kind resources reasonably required to support planning activities for the Project, with the intention of implementing the Project, subject to a written Project Agreement.	
LIMITATIONS & LEGAL FRAMEWORK	
We understand that this Letter of Commitment focuses solely on resource allocation and engagement intent in the planning of the Project. Matters regarding Intellectual Property (IP), detailed project deliverables, publication rights and other legal obligation shall be governed by the separate written Project Agreement to be signed by both/all parties.	
AUTHORIZATION	
Authorized representative	Date:
	Name Signature

A2. Project Closure Template

GENERAL INFORMATION			
Project name			
PROJECT CHECKLIST			
	Approved	Date	Comments
Project checked against project plan	FALSE		
In-kind contribution reported and approved	FALSE		
FOLLOW-UP			
Time for follow up on impact	Place	Date	
COMMENTS			
Comments and reason, if the project was terminated in advance			
PROJECT APPROVED BY			DATE