FABrIC | Powered by CMC

Quantum Computing Sandbox Guide

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Sandbox

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Canada’s Semiconductor Ecosystem. Accelerated.

FABrIC: A generational investment by the Government of Canada

FABrIC is a Strategic Response Fund initiative of the Government of Canada to expedite domestic capabilities in advanced semiconductor design and manufacturing. Managed by CMC Microsystems, FABrIC galvanizes national strengths in compound semiconductors, microelectromechanical systems (MEMS), photonics, and quantum technologies, accelerating commercialization and amplifying Canada's competitive advantages by maximizing the economic impact of its semiconductor sector.

Marquee programs include Challenge funding, the Quantum Computing Sandbox and Training. Challenge funding supports the development of fabrication processes and IoT products that build national capacity. The Quantum Computing Sandbox is Canada’s first program to enable access to state-of-the-art quantum computing platforms. The FABrIC training portfolio provides specialized skills development for graduate students, early and mid-career professionals in the highly technical and demanding processes of the semiconductor sector.

It also connects the semiconductor sector into Canada’s major industries. As change transforms global trading relationships, forging these connections is integral to the semiconductor sector, to the ability of these critical Canadian industries to innovate and compete – and to bolstering national sovereignty.

CMC Microsystems

Founded in 1983, CMC Microsystems (CMC) has been instrumental to the success of Canada’s semiconductor industry. Over the decades, its highly regarded training programs have honed the skills of tens of thousands of semiconductor professionals. From quantum software and hardware to passive silicon photonics, it has fortified the pipeline of highly qualified personnel (HQP) that are the bedrock of market success.

It has established cost-effective access to sophisticated tools and technologies essential for academic research, R&D, and emerging companies. During the era of globalization and subsequent fab and foundry consolidation, it negotiated critical manufacturing agreements that enabled emerging Canadian companies to prototype and test their products. The domestic industry would have been severely compromised without CMC’s efforts. CMC Microsystems is a not-for-profit organization.

Acknowledgements

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Canada

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To download a copy of this publication in French: fabricinnovation.ca/fr

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Introduction

FABrIC is a five-year, $217M project to help secure Canada's future in semiconductors.

Quantum Computing Technologies will drive the next generation of applications in key economic sectors such as Advanced Manufacturing & Materials, Natural Resources, Energy & Environment, and Healthcare & Life Sciences, among many others. Quantum technologies are expected to be profoundly transformative economically and socially. That has led governments around the world to commit unprecedented investments to accelerate their development and encourage breakthrough applications that protect national security and industrial competitiveness. Long a leader in quantum research, Canada has an opportunity to strengthen its position and capture the economic benefits of this fast-moving sector by translating scientific excellence into commercial advantage.

To maximize its returns as quantum technologies evolve, focused investments that accelerate R&D, adoption, and commercialization are essential – and will ensure that Canadian industry and post-secondary institutions have the talent and infrastructure necessary to innovate and translate scientific breakthroughs into economic advantage.

FABrIC's Quantum Computing Sandbox (QCS) is the first program to accelerate the adoption of quantum computing technology in Canada. It provides technical expertise and enables access to state-of-the-art quantum computing platforms to small/medium sized enterprises (SMEs) and academics.

The QCS calls stimulate the development of industry relevant applications of quantum computing in Canada, strengthen domestic R&D in areas of strategic importance and drive the adoption of quantum computing solutions by end-sector users.

The QCS funds direct access to quantum computing cloud services offered by global providers. For a full list of available providers please refer to the QCS webpage. The QCS welcomes applications requesting other quantum computing cloud services not listed.

The QCS also provides technical expertise from CMC Microsystems' specialized team of quantum application scientists, to help shape access requests of an application, as well as support the development and deployment of the applicant's project.

The QCS calls are intended to:

- Increase the participation of Canadian SMEs, and academics adopting, developing and/or commercializing quantum computing solutions
- Develop quantum computing technologies that benefit end-use sector
- Increase the development and utilisation of Canadian skills and quantum computing technologies
- Deliver economic benefits to Canada through job creation, talent retention, IP creation,
- Pave the way to a commercially viable domestic quantum industry that delivers sustainable revenue to the Canadian economy.

FABrIC Strategic Objectives

Ecosystem and Collaboration	Create a vibrant and sustainable ecosystem that provides networking, training, and collaboration opportunities which enable Canadian industry, NFP's, academics and researchers to work together to advance and accelerate semiconductor product commercialization and the development of semiconductor technology and related intellectual property (IP) for the benefit of Canada.

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Accelerate Quantum Applications	Accelerate the development of quantum-ready companies and quantum computing applications in Canada by providing access and technical assistance to small/medium sized enterprises (SMEs) and academics for quantum-based hardware and software development and prototyping.
New Advanced Sensor and Semiconductor Chips	Foster the growth and expansion of companies developing and commercializing advanced sensors and other semiconductor chips and services in Canada targeted at the rapidly growing and strategically important IoT market with direct applications in clean tech, electrified vehicles, 5/6G data communications, healthcare, agriculture, biotech, mining and other strategically important sectors in Canada.
Fabrication Supply Chain Capacity and Capability	Develop widely accessible semiconductor fabrication capacity and capability in Canada to strengthen and deepen Canada's supply chain for the design, prototyping, fabrication, assembly, and test of new advanced sensors and other made-in-Canada semiconductor products addressing the Internet of Things (IoT) market. Key areas of focus are compound semiconductors, microelectromechanical systems (MEMS), photonics, quantum technologies, such as superconducting technologies, and related advanced packaging and test technologies.
Secure Pipeline Of HQP	Create and train a sustainable pipeline of highly qualified personnel (HQP) with critical skills required for product development and manufacturing roles in Canadian semiconductor companies.
Canadian Intellectual Property	Create Canadian intellectual property (IP) and commercialize this IP for the benefit of Canada.
Sustainable Innovation Platform	Provide a sustainable FABrIC Innovation Platform for Canadian academics, researchers, and SMEs which provides them affordable, timely access to state-of-the-art semiconductor design tools (CAD), fabrication and assembly technologies (including access to global supply chains), test and characterization tools, and technical expertise in product development and manufacturing needed to train HQP and to advance novel product and device development projects.
Enhance National Security and Resilience	Enhance national security and resilience in the supply of critical semiconductor products and technologies by strengthening supply chain with trusted Canadian partners and increasing the pool of highly trained specialists in semiconductor product design and fabrication technologies.
International Collaboration	Promote international collaboration and partnerships to attract international investment and HQP to Canada and to exchange knowledge and best practices related to semiconductor fabrication, product development, and supply chain.

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The QCS program aligns with FABrIC Strategic priorities as follow:

Novel Quantum Computing Solutions
Foster academic and industrial projects to drive development and adoption of quantum computing solutions with direct applications in sectors that are strategically important to Canada.

Canadian Intellectual Property
Create Canadian intellectual property (IP) and/or commercialize this IP for the benefit of Canada.

National Security and Resilience
Enhanced by driving the development and adoption of quantum computing technologies by Canadian industries.

Collaborations
Foster collaborations between academics and industry to translate research into industrial applications.

Talent
Build a sustainable pipeline of HQP in Canada to support the development and adoption of quantum computing technologies.

QCS is specifically focused on:

1. Developing quantum computing applications for end-use sectors.
2. Adoption of quantum computing solutions by end-use sectors.
3. Scaling quantum computing solutions.
4. Demonstrating state-of-the-art quantum information processing tasks.

Projects must fit into one of the following categories:

- **Demonstration**: Deploying an industry-relevant quantum application at scale
- **Adoption**: Exploring what can be done with quantum computing in end-use industries
- **Discovery**: Pushing the boundaries of quantum information science

Projects Tiers (lengths) are:

- 13 weeks
- 26 weeks
- 52 weeks

FABrIC will provide up to $100,000 in quantum computing access to Sandbox Recipients (SR). CMC Microsystems (CMC) will enter into agreements with quantum computing providers to secure quantum computing resources for SR. QCS resources must be specifically for use in eligible activities. SR will directly access those quantum computing resources, without any intermediary, and cannot grant access to these resources to third parties.

Management Fees: Each project includes a management fee of 5% for quantum computing access costs to be paid to CMC. The fees directly support FABrIC team activities for administering the program and facilitating the work of the project participants.

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Definitions

Lead Organization	The organization leading the project proposal application process. They are the FABrIC main point of contact and, if successful, the organization that ultimately becomes the "Sandbox Recipient (SR)" of the Sandbox Recipient Agreement (SRA) responsible for the overall management of the project. The Lead Organization must be a FABrIC member.
Collaborator	An organization that is not a signatory to the Sandbox Recipient Agreement but (1) is included in a project work plan and is responsible for project activities outlined in the project proposal, and/or (2) is making in-kind contributions to a project that enables completion of project activities. Up to 2 Collaborators per application are acceptable for the QCS. The Collaborator must be a FABrIC member.
Sandbox Recipient (SR)	The one Lead Organization who receives direct access to quantum computing resources and carries out Eligible Activities as part of the QCS.
Sandbox Recipient Agreement (SRA)	The agreement that will eventually follow a successful proposal and be signed by the Sandbox Recipient setting out the terms and conditions of the proposed and approved Project.
Cloud Service	A quantum computer that is accessed remotely through an interface with a higher-level of circuit abstraction, without the user or a human intermediary interacting directly with the control hardware of the quantum computer.

Quantum Computing Sandbox (QCS) Support

All QCS projects will be granted a minimum of 8 hours/week* of technical support to assist in the development of the project. QCS support will be provided by CMC's Quantum Computing Scientific Staff, who will also oversee project development and management. Requests for additional support beyond 8 hours/week* can be indicated on the application form.

Application Submission Process

- A complete Application form must be submitted by email to qcs@fabricinnovation.ca. The Application form is posted on the QCS webpage.
- The attestation and signature template must be completed and included in the email with the application.

Key Dates

For the time period stated below, the QCS Call will be continuously open with fixed periods for application evaluation as also stated below.

* Please contact us for exceptional requests at qcs@fabricinnovation.ca

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- **August 5, 2026** – QCS Call open for submission
- **August 18, 2026, 1:00 PM ET** – First QCS Webinar. Subsequent webinars will be announced on the QCS webpage.
- **Submission dates***:
  - > September 28, 2026 5:00 PM ET
  - > January 25, 2027 5:00 PM ET
  - > May 31, 2027, 5:00 PM ET
  - > September 27, 2027, 5:00 PM ET
  - > January 31, 2028, 5:00 PM ET

As of January 31, 2028, the QCS program is closed and will not be accepting any additional applications.

Key Requirements

Quantum algorithms	The project must develop and deploy quantum algorithms in real state-of-the-art quantum computing hardware.
Intellectual Property (IP)	Ownership of all foreground IP created through the project must remain in Canada and be used for the benefit of Canada for a minimum of five years after the completion of the project.
Training & retention of HQP	The project must contribute to the development and retention of HQP in Canada including, for example, training for interns, job creation, job retention etc.
Equity, Diversity, Inclusion (EDI)	The project should demonstrate alignment and advancement of the principles of equity, diversity, and inclusion.
Capacity	Lead organizations must demonstrate that they have sufficient resources to carry out the project to conclusion.
Maximum support	Estimated project costs for quantum computing access are up to $100,000 CAD.
Duration	Typical project duration is expected to be 3 to 12 months after the agreement is signed
Prioritize domestic platforms	Projects are encouraged to leverage existing Canadian quantum computing platforms where possible. Collaboration among post-secondary and industry partners in Canada is encouraged.
Need	Applicants must provide evidence for the need for QCS access provided through FABrIC.
Incremental opportunities	Projects must be incremental to the regular business of the participating organizations. The proposed quantum computing access must not already

* Dates are provisional and final dates will be confirmed on the QCS Webpage

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	be approved or in progress, must be distinct from investments that would have otherwise occurred, and would not be undertaken at the same scope or scale without the support of FABrIC
Ineligible	Projects involving quantum computing hardware not offered through a cloud service will not be considered.

Basic Eligibility for Applicants

- Lead Organizations must be an incorporated or a registered business in Canada and have significant operations in Canada. Lead and Collaborator organizations include:
  - For-profit Small and Medium-sized Enterprises (SMEs) (<500 employees),
  - Not-for-profit organizations,
  - Post-secondary institutions in Canada or research institutes in Canada that are wholly owned by post-secondary institutions in Canada,
  - Indigenous organizations in Canada.
  - International post-secondary or research institutions may not participate as a Lead but may participate as a Collaborator.
  - Multinational Enterprises (MNE's) may not participate as a Lead but may participate as a Collaborator.
- The Lead Organization must be FABrIC Member to complete the submission of an application. See fabricinnovation.ca/member.
- Only organizations may apply. Individuals are not eligible.
- The Lead and Collaborators Organization(s) are recommended to have at least three (3) full-time equivalent employees.
- Sandbox Recipients of FABrIC QCS direct access and support must be in compliance with economic sanctions, financial sanctions, and trade embargoes administered by the Government of Canada.

Basic Requirements During Project Execution

- All project work must be performed in Canada, unless otherwise pre-approved in writing. A maximum of 10% of work may be performed outside of Canada with pre-approval.
- All Sandbox Recipients are required to report on all project activities, submit a final report and supporting documents 2 months after the project end date. Other reporting may be required.
- Further terms and conditions are stated in the Sandbox Recipient Agreement.

Selection Process

Step 1: Call for QCS Projects

The call will be issued on the FABrIC website, and QCS guides, application templates and supporting documents will be posted.

Upon request, the QCS team will provide support to facilitate the applicants' efforts to produce project proposals that best address FABrIC project goals and help define the quantum computing resource and technical support needs.

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Step 2: Application Submissions

Lead organizations will **complete** the Application submission according to the QCS guide and **submit** via email to qcs@fabricinnovation.ca, on or before the posted submission deadline for a given evaluation period.

Step 3: Initial Review

The QCS team will review Applications to ensure that the proposals meet the eligibility requirements as provided in the QCS Guide according to Table 1, below. To fully access the project, further information and clarification may be requested of the Lead Organization.

Step 4: Project Evaluation and Scoring

All project proposals will be subject to an independent assessment process undertaken by two (2) members from the Quantum Computing Sandbox Evaluation Group (EG) who will form an expert assessment panel. They will evaluate, score and rank the submitted project proposals using the screening criteria in Table 1 and Sandbox Project Selection Criteria, below. The EG will ensure that approved projects are of high quality, meet FABrIC's strategic objectives, and will recommend projects for acceptance on a fair basis.

The FABrIC Advisory Committee (FAC) is a group of up to 15 independent, recognized Canadian experts in the five key technology areas covered by FABrIC: compound semiconductors, photonics, MEMS, quantum, and IoT (including edge AI). The FAC reports to CMC's Board of Directors. The QCS EG is a pool of independent experts in quantum computing technologies and includes members from industry (SMEs, MNEs and NFPs) and post-secondary institutions, from across Canada and abroad. EG members have varied quantum computing technology backgrounds, and technical and strategic expertise.

The identity of experts participating in individual project assessments will be kept confidential.

Members of the FAC and QCS EG sign non-disclosure agreements as well as conflict of interest disclosures to ensure independence and confidentiality.

Step 5: Final Project Review and Approval

Based on the QCS EG's ranking results and the available services envelope, the FAC will recommend selected projects for final approval to the CMC Board.

The CMC Board will review the recommendations from the FAC to ensure the selection process has been followed, and if so, will approve the corresponding projects. Note the CMC Board will not assess or be directly involved in the selection of projects.

FABrIC will notify Innovation, Science and Economic Development Canada (ISED) of the selected projects. The FABrIC QCS team will notify each successful applicant and proceed with the development and completion of a Sandbox Recipient Agreement with the Lead organization.

Applicants for projects that are not recommended for approval will be notified, with a summary outlining the reasons why they were not approved, as well as any recommendations to strengthen their applications. These applicants may re-apply to the QCS Call for subsequent evaluation periods.

Table 1: QCS Project Pass/Fail Criteria

1) **Organizational requirements:**

   a. All Lead Organizations are incorporated or registered in Canada and have significant operations in Canada and are one of (a) for-profit organizations (<500 employees), (b) not-for-profit organizations, (c) post-secondary institutions situated in Canada, (d) research institutes situated in Canada that are wholly owned by post-secondary institutions in Canada, d) Indigenous Organization in Canada.

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b. Not-for-profit organizations based in Canada, must be incorporated under the Canada Not-for Profit Corporations Act (CNCA) or similar Provincial Act.

c. One Lead and at maximum 2 Collaborators.

d. No Leads are international post-secondary institutions or MNEs. International post-secondary institutions and MNEs are not eligible for funding but may participate as Collaborators.

e. All Lead Organizations are recommended to have a minimum of 3 full-time equivalent employees.

f. If applicable, the structure of subsidiary organizations have been identified and verified. Evidence that Canadian operations are substantial with appropriate autonomy.

2) **Project Budget and quantum computing resources:**

a. Quantum computing access request does not exceed $100,000 CAD.

b. Quantum computing resources needed for the project are clearly defined.

c. Demonstrated need for FABrIC funding.

3) **Ability to execute:** Evidence that:

a. The team has the technical skills and human resources to complete the project.

b. Critical collaborators have been identified.

c. Specific areas for CMC-provided R&D support are clearly identified (required when the Lead and Collaborators lack certain, but not all technical skills needed to develop the project).

d. Major project activities have been identified.

4) **Benefits to Canada:** Evidence of:

a. Job creation/retention, HQP training.

b. EDI initiatives.

c. IP that will be generated in Canada.

QCS Project Selection Criteria

Projects will be assessed based on the following criteria:

Category	Criteria	Score
Industrial Adoption	Demonstrates a pathway to industrial application for end-use sectors of quantum computing, or the quantum computing industry itself	**15**
R&D Impact	Advances the state-of-the-art or opens new domains for quantum computing R&D	**15**

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Capability	Applicants have the necessary technical expertise and resources to implement on their proposal	**10**
Quantum-Ready Workforce	Trains or upskills Highly-Qualified Personnel in industry-relevant applications of quantum computing	**15**
EDI	Includes elements and activities to advance the principles of equity, diversity, and inclusion.	**5**

Proposals evaluated to be excessively weak in their demonstration of any selection criteria may not be successful.

Equity, Diversity, and Inclusion

FABrIC is powered by and managed by CMC Microsystems. CMC is unwavering in its commitment to the principles of Equity, Diversity and Inclusion (EDI). We believe that fostering an inclusive environment enhances innovation, creativity, and excellence. We recognize that a breadth of perspectives, skills, and experiences contribute to excellence in research and innovation. This culture is the responsibility of every participant in the ecosystem, including employees, funders, investors, sponsors, institutions, companies, researchers, advisors, administrators, and reviewers. As part of our dedication to EDI, CMC is also actively participating in the Government of Canada's 50-30 Challenge, which aims to accelerate gender parity and the inclusion of under-represented groups in leadership roles.

EDI is a cornerstone of our governance and operational practices. FABrIC Challenge, Innovation Platform and Ecosystem Development proposals that advance EDI principles are given additional assessment points, reflecting our commitment to creating a diverse and inclusive community. We recognize that embracing EDI is not just a goal, but a continuous journey. By embedding these values into our decision-making and resource allocation processes, we aim to ensure that our investments yield the maximum benefit for all members of our community.

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Technology Readiness Level (TRL) Definitions

Innovation, Science and Economic Development Canada (ISED) (Innovation Canada) describes stages of development, including a TRL assessment tool and checklist, online at https://ised-isde.canada.ca/site/innovation-canada/en/technology-readiness-levels.

Technology Development Stage	TRL	Definition	Description
Fundamental Research	**1**	Basic principles observed and reported	Scientific research begins to be translated into applied research and development (R&D). Activities might include paper studies of a technology's basic properties.
	2	Technology concept and/or application formulated	Invention begins. Once basic principles are observed, practical applications can be invented. Activities are limited to analytic studies.
Research and Development	**3**	Analytical and experimental critical function and/or proof of concept	Active research and development is initiated. This includes analytical studies and/or laboratory studies. Activities might include components that are not yet integrated or representative.
	4	Product and/or process validation in laboratory environment	Basic technological components are integrated to establish that they will work together. Activities include integration of "ad hoc" hardware in the laboratory.
	5	Component and/or validation in a simulated environment	The basic technological components are integrated for testing in a simulated environment. Activities include laboratory integration of components.
Pilot and Demonstration	**6**	System/subsystem model or prototype demonstration in a simulated environment	A model or prototype that represents a near desired configuration. Activities include testing in a simulated operational environment or laboratory.
	7	Prototype ready for demonstration in an appropriate operational environment	Prototype at planned operational level and is ready for demonstration in an operational environment. Activities include prototype field testing.
Levels 7 through 9 represent the pre-commercialization gap for innovations.	**8**	Actual technology completed and qualified through tests and demonstrations	Technology has been proven to work in its final form and under expected conditions. Activities include developmental testing and evaluation of whether it will meet operational requirements.
Early Adoption	**9**	Actual technology proven through successful deployment in an operational setting	Actual application of the technology in its final form and under real-life conditions, such as those encountered in operational tests and evaluations. Activities include using the innovation under operational conditions.

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