



October 2026

Israel's Quantum Ecosystem

A Case Study in Capital-Efficient Innovation



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Disclaimer: This report is published by the Israel Innovation Authority and C4IR Israel. It draws on public sources, institutional data and selected expert inputs, and is intended to highlight selected features of Israel's quantum ecosystem and relevant policy lessons rather than provide a comprehensive assessment of the field.

Foreword

Over the past decade, quantum technologies have evolved from a promising scientific frontier into a strategic domain with profound implications for economic growth, national resilience, scientific discovery, and technological leadership. Around the world, governments and industries are investing heavily to secure a position in what many regard as the next technological revolution. For Israel, quantum technologies represent not only a scientific opportunity, but also a natural continuation of our longstanding ability to transform deep research into globally significant innovation.

Through the first phase of Israel's National Quantum Initiative, launched in 2019, Israel made a deliberate and coordinated national commitment to quantum science and technology. Working together, government ministries, research institutions, academia, industry, and defense organizations laid the foundations of a vibrant quantum ecosystem. These efforts have helped position Israel among the leading global centers for quantum innovation. What makes Israel's quantum ecosystem particularly distinctive is not its size, but its ability to generate impact. Leveraging a dense network of researchers, startups, investors, multinational corporations, and public institutions, Israel has created an environment where ideas move rapidly from laboratories to real-world applications. Today, Israeli companies are advancing quantum computing, sensing, communications, control systems, software orchestration, cybersecurity, and quantum-enabled applications, contributing critical capabilities to the emerging global quantum economy.

As quantum technologies move steadily toward commercialization and deployment, Israel is preparing for the next chapter.

The proposed second phase of the National Quantum Initiative marks a strategic shift from building foundational capabilities toward maximizing economic, societal, and national value. The focus now is to deepen Israel's technological competitive advantage in quantum hardware, software, control systems, algorithms, sensing technologies, and quantum-secure communications; expand human capital and research excellence; strengthen partnerships with industry, government, and international collaborators; and secure the infrastructure and supply chains necessary for long-term technological leadership. Quantum innovation is inherently global, and continued collaboration with trusted partners worldwide will be essential to accelerating scientific progress, advancing responsible innovation, and translating technological breakthroughs into real-world impact.

Israel's experience demonstrates that even a relatively small nation can play a significant role in shaping the future of transformative technologies when long-term vision is combined with scientific excellence, entrepreneurial culture, and purposeful public investment.

Finally, I would like to thank the many researchers, entrepreneurs, industry leaders, policymakers, government partners, and international collaborators whose expertise and dedication have contributed to both the development of Israel's quantum ecosystem and the preparation of this report. Their collective efforts exemplify the collaborative spirit that will continue to drive innovation and leadership in the years ahead.

The second quantum revolution is already underway. Israel intends not only to participate in it, but to help shape it.



Zachi Schnarch
Acting CEO and Head of the
Technology Division,
Israel Innovation Authority

Preface

This report presents Israel's quantum ecosystem through a structure inspired by the Quantum Economy Blueprint¹, while focusing on Israel's institutional model, infrastructure, research strengths, and emerging pathways to economic and strategic impact. It is intended to support policymakers, industry leaders, researchers, and international partners in understanding how Israel is translating early quantum investment into long-term national capability.

The report adapts the nine-theme architecture of the Quantum Economy Blueprint to the Israeli context, combining ecosystem mapping, public program analysis, infrastructure review, and sectoral adoption considerations. Rather than benchmarking Israel against other countries, it offers a focused national case study that may also serve as a practical reference for governments and stakeholders designing quantum strategies.

Israel's first national quantum programme was designed during 2019-2020, before the publication of the World Economic Forum's Quantum Economy Blueprint in January 2024. The convergence between Israel's programme and the Blueprint therefore reflects parallel responses to the strategic requirements of the quantum field rather than the direct application of the Blueprint. In this report, the Blueprint is used as an analytical lens through which to assess Israel's experience and identify priorities for phase 2 of Israel's National Quantum Initiative (INQI).

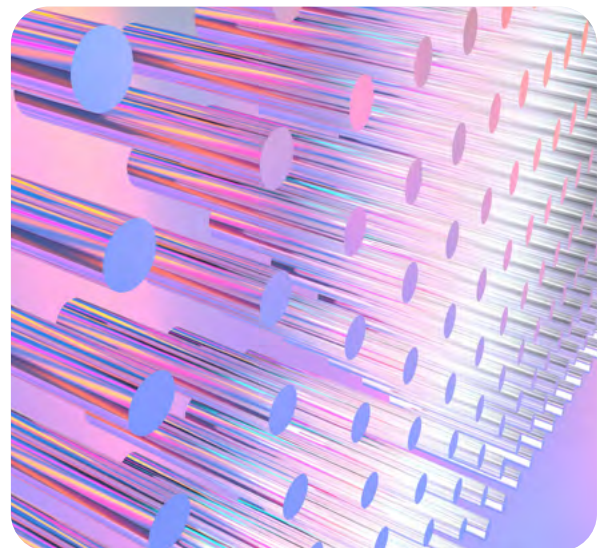
Israel's National Quantum Initiative - proposed 2nd Phase, 2027-2031

The National Committee has recommended a five-year program for 2027-2031. Based on learnings from Phase 1 and the successful launch of an active quantum ecosystem, the proposed directions for phase 2 include the following recommendations: leveraging and expanding international collaborations; securing critical supply chains and infrastructure in photonics, cryogenics and fabrication; strengthening academic excellence and doctoral training; prioritizing quantum software and algorithms; encouraging non-quantum industries and government institutes to develop use cases; expanding workforce training and talent-retention programs; and establishing a dedicated national programme-management body.

Lessons for other national quantum ecosystems

1. Build on existing institutions. Quantum commercialization is more effective when it is embedded in an established innovation system rather than supported through isolated sector-specific instruments.
2. Maintain technological optionality. Supporting multiple hardware and software pathways is valuable while the global technology landscape remains unsettled.
3. Invest in shared infrastructure. National facilities reduce entry barriers, support workforce development and enable collaboration across academia and industry.
4. Develop the demand side deliberately. A strong research and startup ecosystem does not automatically produce adoption among banks, health systems, energy companies or government agencies.
5. Assign clear programme-governance responsibility. Multi-agency funding coordination should be complemented by an entity responsible for implementation, monitoring, international engagement and ecosystem development.

These lessons are analytical conclusions drawn from the Israeli case and the World Economic Forum's Quantum Economy Blueprint.²



Executive Summary

Israel's quantum ecosystem has entered a decisive phase in which the foundational investments of 2019-2025 are transitioning into measurable scientific, industrial, and strategic outcomes. Over the past decade, Israel has built one of the world's most concentrated and agile quantum innovation environments by leveraging academic excellence, defense-driven technological depth, entrepreneurial agility, and coordinated national intervention.

A defining feature of Israel's quantum ecosystem is its capital efficiency: comparatively concentrated public investment has helped catalyse substantial private-sector activity, company formation and venture investment. This outcome reflects not only the national quantum programme, but also the broader Israeli innovation system onto which the quantum sector was built.³

National investments through the first National Quantum Initiative (INQI) catalyzed rapid structural development: dozens of new research laboratories, the Israeli Quantum Computing Center (IQCC), and more than twenty startups operating across hardware, control, software, sensing, and secure communications supported in early stages by the Israel Innovation Authority. These achievements reflect not only scientific capability but also the effectiveness of Israel's mission-oriented innovation model.

Israel's research community demonstrates exceptional breadth, spanning superconducting qubits, trapped ions, photonics, NV-center devices, quantum optics, error-correcting codes, cryptography, and hybrid classical-quantum

algorithms. This scientific strength directly fuels a robust industrial ecosystem including Quantum Machines, Classiq, QuamCore, Quantum Art, Quantum Source, LightSolver, OPSYS Technologies, and others.

The IQCC places Israel among a small group of nations with multi-modality access to superconducting, photonic, and spin-qubit platforms. It enables algorithm testing, benchmarking, hybrid workflows, and hands-on workforce training, while planned upgrades (including a 49-qubit superconducting processor) deepen national sovereign capacity.

Despite strong scientific and industrial momentum, adoption readiness remains uneven. Defense, aerospace, and secure communication sectors show early uptake, while health, finance, energy, and logistics require structured pilot programs, workforce scaling, managerial awareness, and integration frameworks. Key challenges include talent shortages, hardware dependence, limited validated use-cases, and cross-government coordination gaps.

Looking ahead to the proposed second phase (2027-2031), Israel's priorities should include: scaling the quantum-skilled workforce; advancing sovereign supply-chain elements in photonics and cryogenics; accelerating national pilot programs for industry adoption; strengthening academia-industry collaboration through shared testbeds; and establishing governance mechanisms that align defense, academia, and the private sector. With coordinated action, Israel can reinforce its global position as a fast-moving, impact-driven quantum innovation hub.



Introduction

Quantum technologies are transitioning from academic research to national-level strategic assets. Nations view quantum computing, sensing, and communications as central components of future economic resilience, defense capabilities, and scientific leadership.

Israel's quantum landscape has developed rapidly through coordinated public investment, mission-driven research initiatives, and a concentrated scientific talent base.

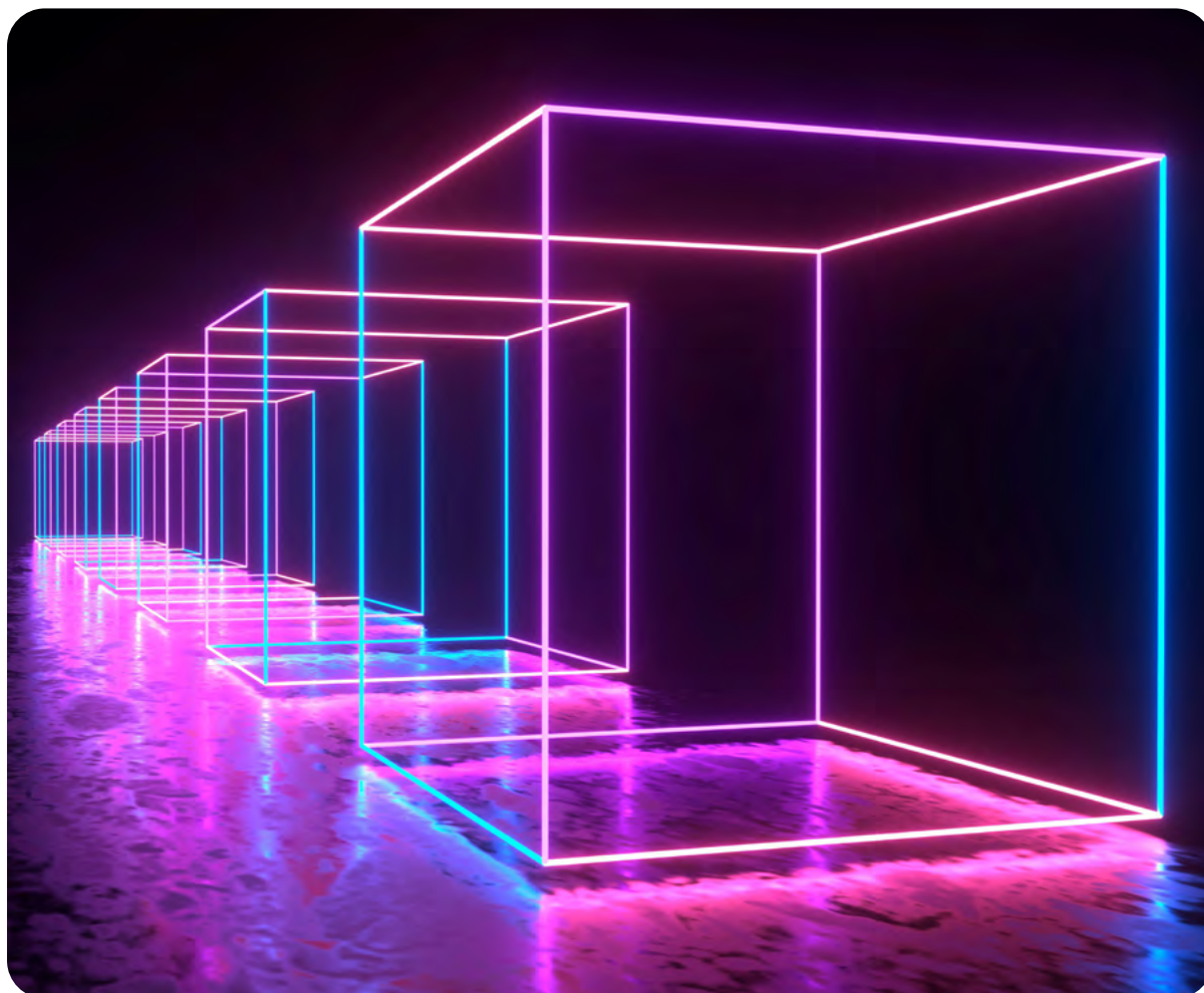
This report presents Israel as a case study, offering practical insights without relying on cross-country benchmarking.

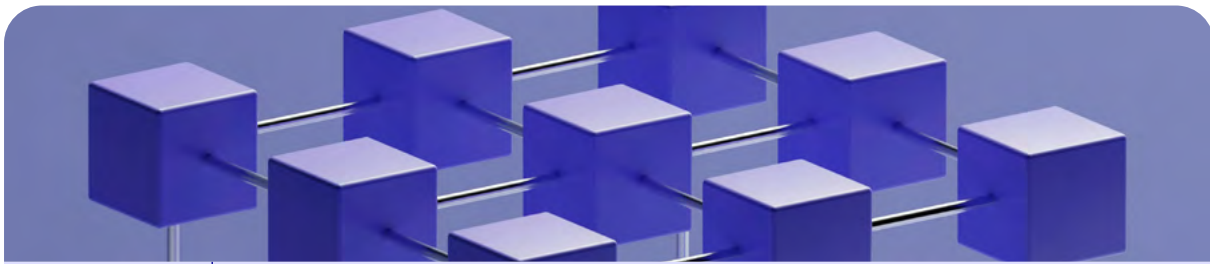
Israel's quantum ecosystem cannot be understood in isolation from the broader innovation system surrounding it. Israel already had a mature deep-tech commercialization environment, including experienced technology-transfer offices, venture investors, accelerators, public R&D instruments and established pathways

through which researchers move from academic laboratories into company formation.

Quantum therefore developed as an extension of an existing commercialization culture rather than as a standalone sector built from the ground up. This institutional foundation helped shorten the path from scientific discovery to funded commercial activity and contributed to the relatively high leverage of private investment over public investment.⁴

This report examines Israel's quantum ecosystem as a case study in translating concentrated public investment, scientific excellence and national infrastructure into emerging commercial and strategic capabilities. It highlights areas of relative strength, identifies remaining gaps in adoption and ecosystem development, and draws practical lessons that may be relevant to other countries developing their own quantum strategies.





1

Themes and Building Blocks

The first part of this report presents the core themes and enabling building blocks that shape Israel's quantum economy. These themes are adapted to reflect the country's specific strengths in mission-driven innovation, dense academia-industry linkages, national infrastructure, and security-relevant technological development.

1.1

Theme 1: Transformative Capabilities

Israel's innovation model is built on a distinctive combination of strategic public investment, agile policy instruments, and deep collaboration among academia, multinational R&D centres, government research institutions, particularly in dual-use technologies and industry. At the centre of this ecosystem, the Israel Innovation Authority serves as a national catalyst for the development of transformative technologies with global potential. The model emphasizes early identification of emerging fields in which Israel can build technological leadership, followed by targeted intervention to reduce market failures and accelerate commercialization.

The quantum programme builds on a broader portfolio of Israel Innovation Authority instruments that support companies across the innovation lifecycle—from early-stage R&D and technological incubation to industrial scaling and international market entry. These mechanisms include conditional R&D grants, technological incubators, support for multinational R&D activity, bilateral industrial

R&D programmes and dedicated pathways for companies moving from research into commercial production.

In breakthrough domains such as quantum technologies, the Israel Innovation Authority operates through a portfolio of tailored instruments designed to address each stage of the R&D pipeline. Competitive calls for applied research consortia enable universities, research institutes, and leading companies to jointly develop foundational capabilities that are too risky or costly for any single player. These consortia create shared intellectual property, advanced training opportunities, and durable research infrastructure.

Complementing this, the Israel Innovation Authority invests in large-scale national infrastructures that serve as testbeds for next-generation technologies. In quantum computing and communications, Israel has established national labs, demonstration networks, and access to heterogeneous quantum processor platforms, including superconducting, trapped-ion, photonic, and neutral-atom systems. These infrastructures greatly reduce entry barriers for startups and researchers by providing high-cost equipment, skilled technical staff, and secure environments for experimentation.

The Israel Innovation Authority also funds accelerators, incubators, and mission-driven commercialization programs that help transform scientific breakthroughs into market-ready products. In quantum, this includes support for startups building hardware components, quantum-safe cybersecurity tools, advanced software stacks, and hybrid quantum-classical algorithms for optimization, chemistry, and materials.

Multi-agency coordination

Israel's first national quantum programme was implemented through coordinated action across several public bodies. The Council for Higher Education, through the Planning and Budgeting Committee, supported academic activity; the Israel Innovation Authority supported industrial R&D and collaborative consortia; the Directorate of Defense R&D advanced application-driven research; and the Ministry of Innovation, Science and Technology supported academic and international cooperation. The Ministry of Finance provided core allocations and supported cross-agency coordination through the TELEM forum (National R&D Infrastructure Forum).⁵

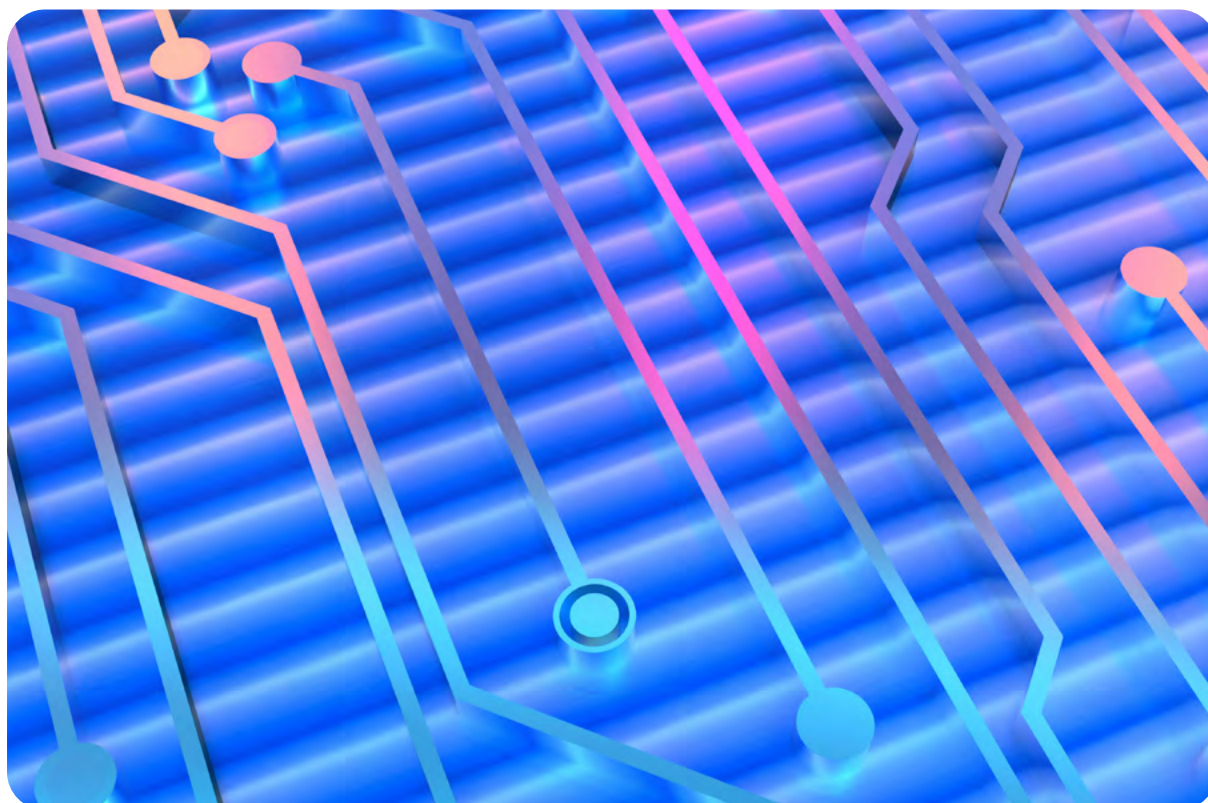
Three features distinguish this model: it is mission-oriented rather than discipline-oriented; it combines supply-side investment with demand-side participation by public-sector users; and it allows resources to be reallocated during implementation as technological and ecosystem conditions evolve.

A defining feature of the Israeli model is its emphasis on strategic partnerships. Israel maintains collaborations with the United States, Europe, and Asia in quantum science, leveraging joint research funding, access to global facilities, and participation in international standardization efforts. These partnerships enhance Israel's ability to navigate the rapidly evolving global quantum landscape.

The Israeli model also places deliberate emphasis on demand creation. The Israel Innovation Authority promotes early adoption of quantum-enabled solutions across government, industry, and critical infrastructure by encouraging pilot programmes in areas such as defense, healthcare, logistics, and finance. This approach accelerates organizational learning and helps local companies validate their technologies with real users and operational contexts.

Israel's innovation system also integrates human-capital development as a core policy tool. Through scholarships, professional retraining programs, and joint academic-industrial curricula, the country cultivates a new generation of quantum engineers, algorithm developers, and hardware specialists. This talent base is essential for sustaining long-term national competitiveness.

Finally, the model is characterized by continuous evaluation and adaptation. The Israel Innovation Authority tracks global developments, consults with experts, and iteratively updates its instruments to ensure that Israel remains at the frontier of breakthrough technologies. In quantum-one of the most strategically significant fields of the 21st century-this adaptive approach supports the development of a resilient, globally connected, and innovation-driven ecosystem.



1.2

Theme 2: Transformative Capabilities and National Quantum Initiative (2019-2025)

The National Quantum Initiative (2019-2025) laid the foundations of Israel's modern quantum ecosystem. It supported the creation of dozens of new research laboratories, the recruitment of young faculty in quantum engineering, and major upgrades to national infrastructure.

The first national quantum initiative, launched in 2019, marked the beginning of a coordinated national effort to build Israel's capabilities across quantum computing, communication, sensing, and enabling technologies. By the end of 2025, the program effectively executed nearly the full planned budget, demonstrating strong institutional commitment and rapid growth of the national ecosystem.

The total planned allocation of approximately \$413 million was matched by an estimated execution of approximately \$409 million when including expected industry and academia cost-sharing, with actual spending likely even higher once full 2025 data is accounted for. Four primary funding bodies, VATAT (the Planning and Budgeting Committee), the Israel Innovation Authority, MAFAT, and the Ministry of Science, carried the operational burden of the programme, each contributing according to its mandate and strategic priorities.

VATAT reached approximately **\$149 million**, compared with an original plan of approximately **\$145 million**, or around **\$168 million** when including cost-sharing. The main gaps relative to the programme design were slower-than-expected recruitment of new academic faculty and delays in institutional equipment procurement.

The Israel Innovation Authority exceeded its original budget expectations significantly. The Israel Innovation Authority invested approximately **\$87 million** in grants, almost double the planned budget, reflecting an overall public-private investment of approximately **\$141 million**. The over-execution reflects the strategic prioritization of quantum science and technology (QST) and was driven largely by the establishment of three additional R&D consortia - in quantum computing, photonic quantum technologies, and quantum communication - beyond what was originally envisioned, as well as the cancellation of a planned second consortium in quantum sensing.

MAFAT (the Directorate of Defense R&D) also exceeded its planned budget, implementing approximately **\$69 million** compared with approximately **\$67 million** planned, or around **\$93 million** with matching funds. Its main deviations included higher-than-expected investments in quantum sensing and international cooperation in sensing technologies, alongside delays in quantum computing programmes. The Ministry of Science executed approximately **\$7 million** of the approximately **\$24 million** originally allocated, leaving a substantial gap whose drivers require further review. Finally, the Ministry of Finance fulfilled its role in providing core budget allocations, while academia and industry contributed an estimated **\$67 million** in complementary funding.⁶

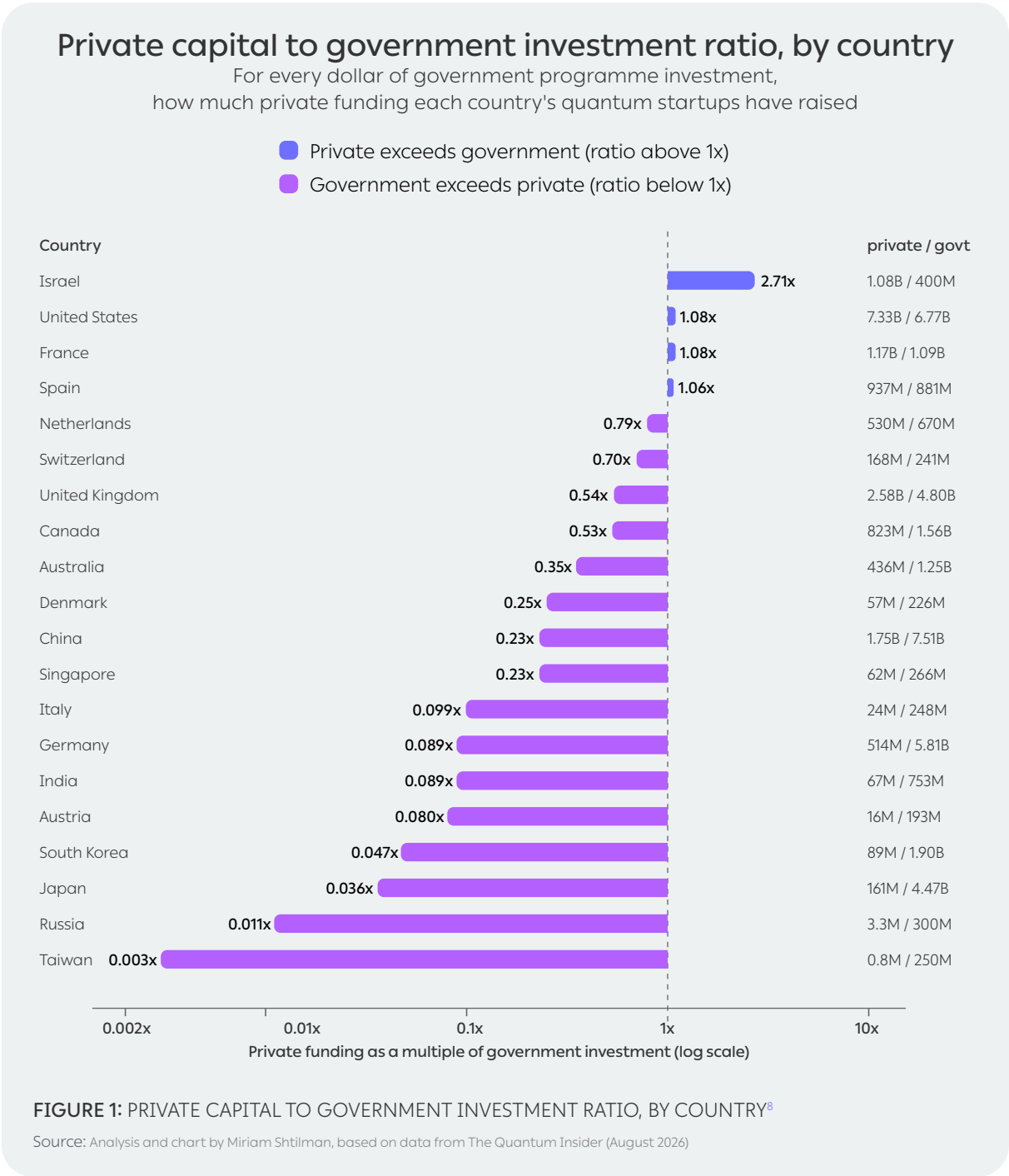
The relationship between public investment and subsequent private-sector growth is an important feature of the programme's performance. Israel accounted for a relatively small share of global public quantum R&D investment while attracting a substantially larger share of global private quantum capital. Although the precise leverage ratio depends on the datasets and denominators used, the pattern indicates that the public programme operated within an innovation system capable of translating targeted public investment into significant private activity.⁷

Beyond budget execution, the program period saw dramatic growth in Israel's quantum academic and industrial landscape. When the initiative began, the industrial ecosystem included only about five companies of which just one, Quantum Machines, was exclusively focused on QST. By 2025, Israel had emerged as a global innovation hub, with more than twenty active companies spanning quantum computing hardware and software, communication, cybersecurity, and sensing. Employment in quantum companies reached approximately 1,000 workers by 2025, compared with an estimated 50 employees in 2019.

Growth was particularly strong in quantum computing, where the number of companies increased from one to more than ten within six years. Approximately four new companies entered the quantum communication and cryptography space, while the sensing sector remained small and stable. Private investment surged dramatically, reaching more than \$1 billion cumulatively by the end of 2025. In 2025 alone, Israeli quantum companies raised nearly \$500 million, representing roughly 9% of global QST private investment and about 15% when excluding the United States. In total private investment, Israel ranked fourth worldwide, following the United States, the United Kingdom, and Canada.

Israel is widely regarded as one of the world's leading hubs for quantum software and control systems, ranking among the top 2-4 global ecosystems in this segment. This position reflects the combined

strength of Israel's academic research, systems engineering capabilities, national infrastructure, and a growing industrial base active across software, control, orchestration and error mitigation.



These trends translated into growing international recognition. A European industrial research consortium assessing global quantum technology hubs ranked Tel Aviv as the world's sixth most significant QST hub, based on indicators such as industry density, research activity, and innovation output. Taken

together, the years 2019-2025 represent the foundational stage in which Israel transformed from a nascent quantum player into a globally competitive, fast-growing ecosystem backed by coordinated government investment, strong academic leadership, and an increasingly vibrant private sector.

Israel's quantum ecosystem, 2019 to 2025

Four indicators of ecosystem growth across companies, employment and investment

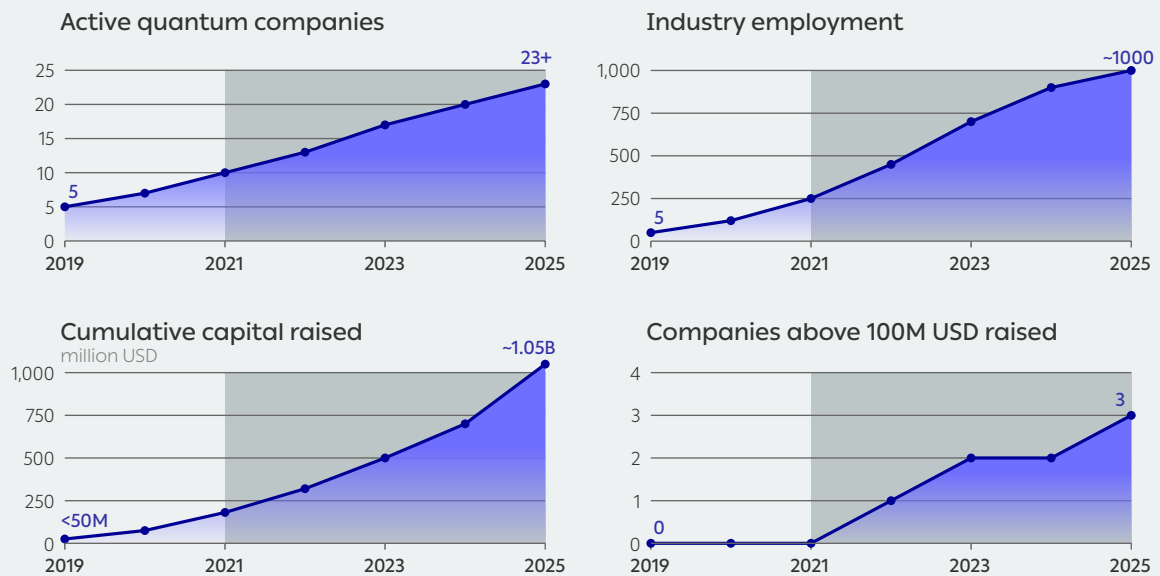


FIGURE 2: GROWTH OF ISRAEL'S QUANTUM ECOSYSTEM DURING THE FIRST NATIONAL PROGRAMME⁹

Source: Israel's National Committee on the Second Quantum Program (2025); QED-C; company communications. Endpoint values are documented; intermediate values are directional estimates.

1.3 Theme 3: Open Innovation and Commercialization

Israel's quantum industry is diverse and includes superconducting qubit developers, trapped-ion innovators, photonic computing companies, NV-centre and photonic-device developers, and providers of hybrid optimization solutions.

Coverage across the quantum technology stack

Israel's industrial ecosystem covers most layers of the quantum technology stack. Companies are active across multiple hardware modalities, including trapped ions, superconducting systems, photonics, neutral atoms, optical computing and diamond-based NV-centre approaches. Additional strengths are visible in control electronics, orchestration, algorithm design, error mitigation, quantum sensing, and quantum communications and security.

This breadth is strategically relevant because the field has not yet converged around a single scalable hardware modality. An ecosystem with activity across several approaches is less exposed to the failure or delayed maturation of any one technological pathway and creates opportunities for shared infrastructure, technical exchange and cross-platform software development.

The principal gap is in quantum materials and specialized production inputs. Israel has limited domestic capacity in areas such as specialized substrates, ultra-pure materials and certain fabrication inputs. This gap should be addressed selectively through infrastructure investment, international partnerships and supply-chain resilience measures rather than through an assumption that every component must be produced domestically.¹⁰

A concise example of this commercialization pathway is Quantum Source, whose photonic approach builds on research developed at the Weizmann Institute. Israel Innovation Authority support helped transfer the knowledge into the company and later supported a Silicon Photonics consortium led by Quantum Source, connecting the underlying technology to additional industrial applications.¹¹

Software, control and orchestration as an Israeli differentiator

One of Israel's clearest areas of existing commercial strength is the layer between physical quantum hardware and end-user applications: software, control and orchestration. Israeli companies have developed capabilities in high-level algorithm synthesis, processor control, hardware orchestration and error mitigation. These capabilities are particularly valuable because they can operate across multiple hardware modalities rather than depending on the success of a single processor architecture.

'Classiq' focuses on high-level, hardware-aware quantum algorithm design; 'Quantum Machines' develops control electronics and orchestration systems; and 'Qedma' develops error-mitigation capabilities for current-generation processors. Together, these companies illustrate an area in which Israel's strengths in mathematics, systems engineering, software and advanced electronics translate directly into quantum-sector differentiation.¹²

This strength in software, control and orchestration allows Israel to participate in global quantum value chains without depending on leadership in any single hardware modality.

This enabling layer also includes precision control electronics: Tabor develops the signal-generation and measurement electronics used to operate and scale quantum processors across architectures.¹³

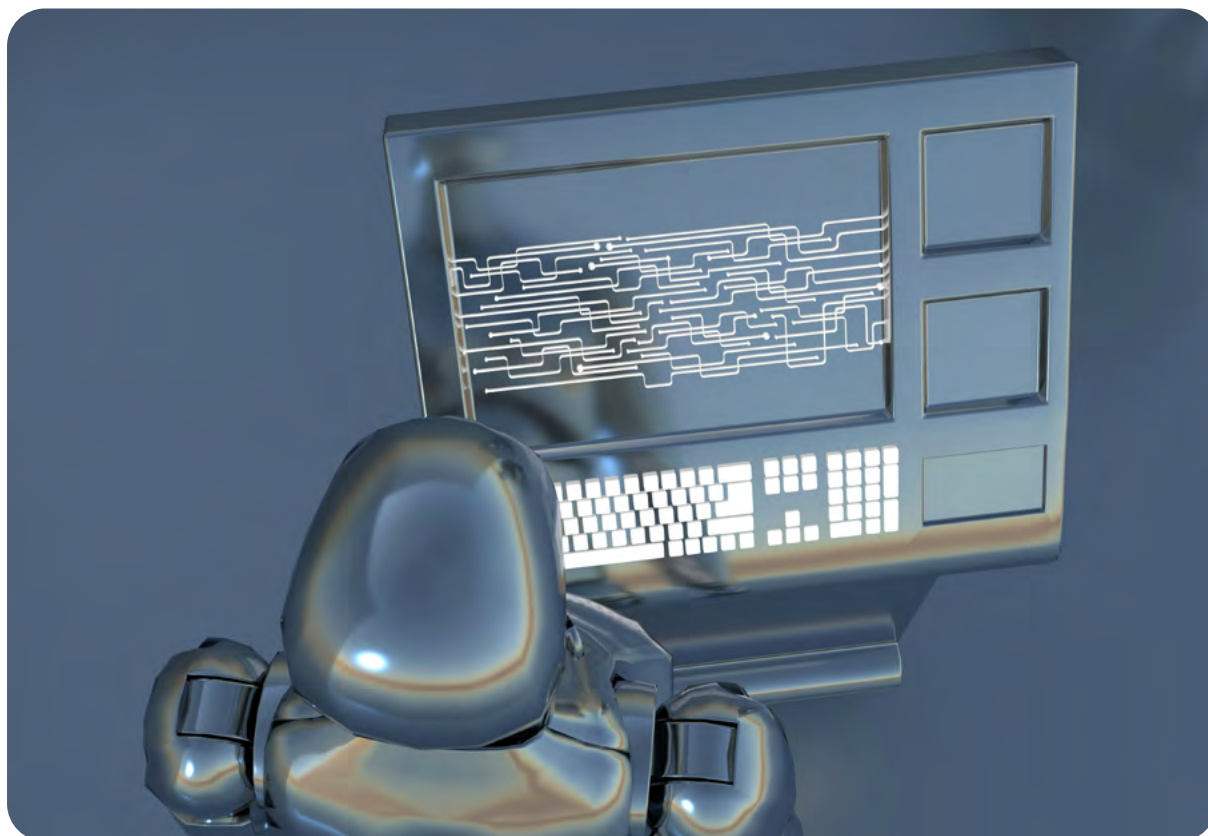
The strategic value of this layer is that it allows Israel to participate in global quantum value chains even without leading in hardware scale or producing every material and component domestically.

AI-Quantum convergence as an emerging Israeli strength

An emerging area of Israeli strength is the convergence between artificial intelligence and quantum technologies. This convergence operates in two directions: AI is used to improve the calibration, control, readout and error-management of quantum systems, while quantum methods are explored as potential tools for machine-learning and optimization problems.

Israeli companies are active across both directions, including AI-assisted quantum development environments, machine-learning-based calibration and control, error mitigation for quantum-machine-learning workloads, and early applications in image processing, traffic optimization, cybersecurity and fraud detection.¹⁴

This area offers a potentially credible near-term pathway because several AI-enabled quantum capabilities can be assessed against present-day technical benchmarks, without depending entirely on the arrival of fully fault-tolerant quantum computing.



Coverage of the quantum stack by Israeli companies

Israeli companies positioned across each layer of the stack
and across adjacent quantum domains

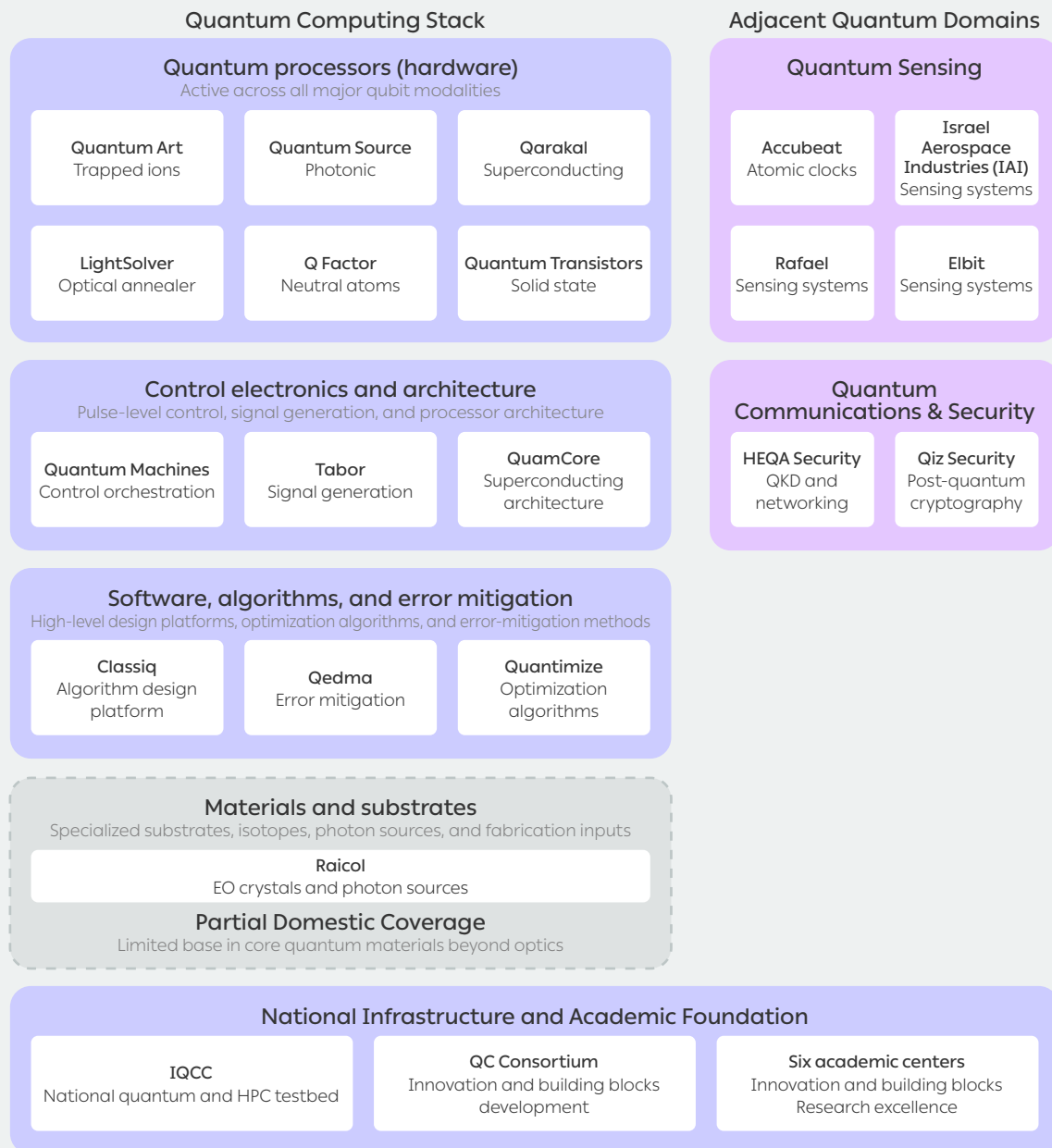


FIGURE 3: COVERAGE OF THE QUANTUM TECHNOLOGY STACK BY ISRAELI COMPANIES¹⁵

Source: Israel Innovation Authority, April 2026. Companies are placed at their primary stack layer; several are active across multiple layers.

Companies such as Quantum Machines, Classiq, Quantimize, and Qedma contribute to orchestration, circuit synthesis, optimization, and quantum software development, while infrastructure operators and platform builders play a central role in connecting research capability to commercialization pathways.

In the sensing domain, AccuBeat, Rafael, IAI/ELTA, and OPSYS Technologies contribute advanced magnetometry, gravimetry, atomic-clock engineering, and quantum-enhanced detection

systems. Heqa Security (QuantLR) advances quantum communications and security through QKD technologies.

External reports emphasize the scale of private investment. Israeli quantum companies raised approximately \$500 million in 2025, bringing cumulative private capital in the sector to more than \$1 billion by the end of 2025.

This places Israel among the most venture-active quantum ecosystems globally, despite its smaller population and limited public funding.

Israeli Quantum Companies by Technology Domain



FIGURE 4: ISRAELI QUANTUM COMPANIES BY TECHNOLOGY DOMAIN

Quantum and Biology

An emerging area of Israeli strength is quantum biology, where quantum science is increasingly being applied both to understanding biological phenomena and to developing new tools for biological measurement. Israel has internationally recognized capabilities in spin chemistry and chiral-induced spin selectivity (CISS), as well as in quantum biosensing, magnetic-resonance techniques, NV-center

sensing, quantum imaging and high-resolution electron microscopy. These approaches may enable measurements of biological processes at unprecedented spatial and temporal resolution, from cellular magnetic fields and neuronal activity to structural dynamics at the nanoscale. While commercial activity remains limited, Israel's scientific depth and highly connected research ecosystem create a strong foundation for future bio-quantum innovation.¹⁶



1.4

Theme 4: Creating Awareness

In Israel, creating awareness is closely linked to the visibility of national infrastructure, hands-on access to systems, and the ability of researchers, entrepreneurs, students, and potential end users to engage with quantum technologies in practical settings. Publicly supported facilities such as the IQCC therefore play not only a technical role, but

also an ecosystem-building role by reducing abstraction, demonstrating capability, and broadening the circle of informed stakeholders.

Qubit IL complements this infrastructure-based approach by supporting quantum literacy, ecosystem engagement and industry awareness across business, government and education.

Case Study: Qubit IL, Israel's Quantum Industry Association

Qubit IL began in 2018 as an informal community of researchers, entrepreneurs and early industry participants, formed around a shared observation: no single body existed to represent, connect and grow Israel's quantum sector across government, academia and industry. The community's growth led to its formal establishment as a nonprofit association in September 2025, aiming to help position Israel as a leading quantum nation.

Qubit IL operates across three main areas. The first is general awareness, through programmes such as Quantum Fellows for senior executives and workshops offered to corporate audiences. The Quantum Fellows programme has grown to more than 100 participants. The second is ecosystem development, including exposure of Israeli quantum technologies to local and

international markets, work with commercial attachés and representation at international conferences. The third is entrepreneurship, through partnerships, hackathons and hands-on coding programmes. The national Quantum Hackathon brings together around 80 students and early-career engineers each year, while accelerator activity has supported an initial cohort of five startups. Qubit IL also partners with the ORT education network on a dedicated quantum major for high schools.

Today, Qubit IL's community includes roughly 3,000 individual members and 15 member companies, alongside working relationships with government bodies including the Ministry of Foreign Affairs, the Ministry of Economy and Industry, the Israel Innovation Authority, and the Prime Minister's AI Directorate.

The IQCC is the central national facility enabling experimentation across hardware modalities. It provides access to superconducting processors, photonic architectures, and spin-qubit devices, allowing researchers and companies to test algorithms, benchmark systems, and simulate hybrid workflows. Planned upgrades, including a 49-qubit superconducting core from Anyon Systems and expanded DGX-Quantum capabilities via NVIDIA, will significantly enhance Israel's computational capacity. The center also supports workforce development by enabling students and engineers to gain real-world experience with quantum systems.

From awareness to structured experimentation

National infrastructure alone is not sufficient to create a functioning quantum economy. Demand-side organizations including banks, energy companies, telecommunications providers, healthcare systems, manufacturers and government bodies must also develop quantum literacy, identify relevant use cases and establish internal capacity for experimentation.

The National Committee on the Second Quantum Program found that structured engagement among Israeli industries outside the quantum sector remains at an early stage. Dedicated exploration teams, internal quantum-literacy programmes and proof-of-concept budgets are not yet common across potential user sectors.¹⁷

The next phase should therefore move from general awareness-building toward structured

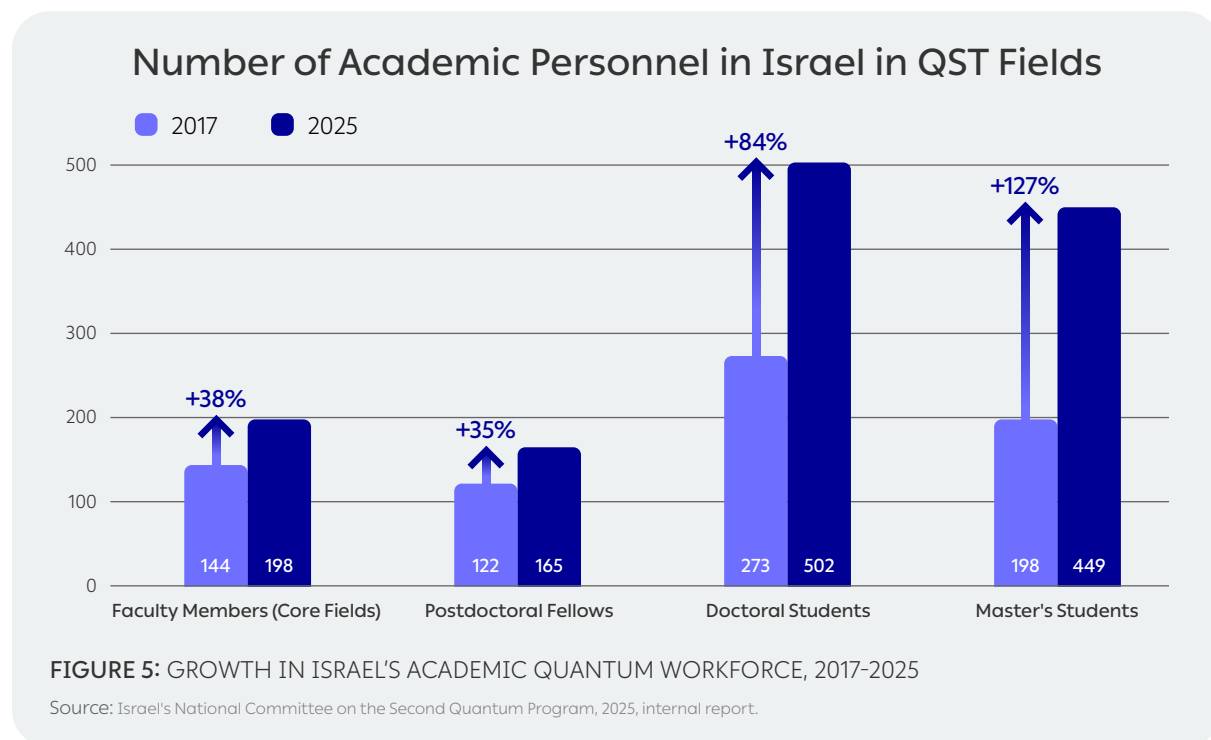
experimentation. Relevant instruments may include co-funded use-case development, organizational readiness assessments, government-supported proofs of concept and dedicated programmes connecting quantum companies with potential users.



1.5

Theme 5: Workforce Development and Academic Strength

Israel's universities maintain strengths in quantum optics, photonics, superconducting circuits, trapped-ion physics, algorithms, cryptography, and quantum information theory. The ecosystem benefits from interdisciplinary programs that integrate physics, computer science, materials science, and electrical engineering.



Strong academic-industry collaboration accelerates experiment design, algorithm development, and technology transfer. Students and researchers routinely transition into startups, defense research labs, and national infrastructure roles.

Academic research as a company-creation engine

Israel's academic quantum ecosystem spans six research universities and combines experimental physics, theoretical computer science, engineering, photonics, materials science, cryptography and quantum information. A distinctive feature is the direct pipeline from academic research groups into industrial company formation: many Israeli quantum companies were founded

by, or employ in senior technical roles, faculty members and graduates from the country's leading institutions.

The Weizmann Institute of Science contributes strengths in trapped ions, superconducting systems, quantum optics, theory and cryptography; the Technion combines quantum engineering, photonics, superconducting systems, error correction and fabrication infrastructure; the Hebrew University is active in NV-centre systems, quantum information, communications and post-quantum cryptography; Tel Aviv University combines quantum optics, communications and interdisciplinary research and hosts the IQCC; Ben-Gurion University contributes atom-chip, sensing and precision-navigation capabilities; and Bar-Ilan University contributes quantum-optics and sensitive-measurement research.¹⁸

1.6

Theme 6: National and Economic Security

Demand-pull from sophisticated users

Israel's national-security and advanced-technology organizations act not only as funders but also as sophisticated early users of quantum technologies. Their concrete operational requirements create short feedback loops between developers and end users, particularly in sensing, communications and computing.

Use cases under development include positioning, navigation and timing in environments where satellite navigation is unavailable or unreliable; highly sensitive detection for underground or undersea monitoring; imaging in low-visibility conditions; and secure communications. These applications are not unique to Israel, but the proximity between users, research groups and technology developers can accelerate validation and technology readiness.¹⁹

AccuBeat illustrates how quantum sensing is already moving into operational infrastructure. Its atomic-clock technologies support precision timing, navigation and synchronization in GPS-disrupted environments and have been deployed in space and other demanding applications.²⁰

International research and industrial collaboration also contributes to the development of Israel's quantum capabilities. Access to specialized research expertise, advanced infrastructure and international technology partners supports local R&D and enables Israeli companies to participate in global quantum markets. The following examples from Europe and the United States illustrate how these connections support research, technology development and commercialization.

Israel and the European Union

Israeli quantum industry companies are at the forefront of international collaborations in validation and verification projects for advanced technologies and research capabilities. Over the past two years, the Israel Innovation Authority has awarded grants totaling nearly €2 million through programs that promote cooperation between Israeli companies and leading research institutes around the world, from Germany to South Korea.²¹

Israel has developed one of the world's most active international cooperation frameworks

in quantum technologies, with the European Union serving as its primary strategic partner. Israel has been formally associated with the EU Framework Programmes for Research and Innovation since 1996, and this collaboration deepened further with the entry into force of Israel's association agreement to Horizon Europe (the 9th framework programme) on 6 December 2021. Through this framework, Israel participates across Horizon Europe's clusters including digital, industry, security, and emerging technologies making quantum science and technology a significant pillar of bilateral cooperation.

Between 2021 and 2024, Israeli researchers and companies secured more than €1.1 billion in Horizon Europe funding.²² These grants span multiple quantum-relevant instruments, including the European Research Council, the EIC Accelerator, cooperative consortia, and digital and advanced-technology sub-programmes. In total, 605 Israeli researchers were awarded approximately €592 million, while 386 Israeli companies received €228 million, with a further €242 million through the EIC Accelerator. Many of these projects include quantum computing, sensing, cryptography, and advanced materials fields directly aligned with Europe's technological sovereignty and digital resilience agenda.



Case Study: QuantERA – Integrating Israel into Europe's Quantum R&D Ecosystem

QuantERA provides a strong example of how participation in European collaborative R&D can strengthen and extend Israel's national quantum ecosystem. Launched in 2016 under Horizon 2020 and now continued through QuantERA III under Horizon Europe, the programme funds multinational projects designed to combine expertise and resources across national borders. Israel has participated since the first call in 2017, with Israeli universities, research institutes and companies taking part in successive projects across quantum computing, communication, sensing, simulation and information science. Participants have included Bar-Ilan University, Ben-Gurion University, the Hebrew University of Jerusalem, the Weizmann Institute of Science, Quantum Machines, Raicol Crystals and NVIDIA/Mellanox.

The value of this participation is reflected in the composition and objectives of the funded consortia. In SPARQL, for example, Bar-Ilan University and Israeli crystal manufacturer Raicol Crystals collaborate with leading European research institutions

on advanced quantum sensing and imaging. QISS-ME brings NVIDIA/Mellanox together with Austrian and German partners to develop integrated quantum-key-distribution technology for datacentre environments, with industrial participation intended to align research activity with practical implementation needs.

For Israel, the strategic value therefore extends beyond access to project funding. Participation in QuantERA connects Israeli actors to complementary scientific expertise, specialised research capabilities and industrial partners; supports long-term international and academia-industry collaboration; and creates pathways from frontier research to technological validation and commercialisation. It also strengthens Israel's integration into the broader European research and policy environment shaping quantum technologies, while complementing domestic capabilities through access to expertise, infrastructures and partnerships available across the wider European ecosystem.

From Frontier Research to Scale-Up

European support for Israel's quantum ecosystem spans the innovation cycle. ERC grants support investigator-led frontier research at Israeli institutions, including recent Horizon Europe projects at the Hebrew University of Jerusalem and the Weizmann Institute in quantum computing and quantum materials. Under the EIC Accelerator's quantum technology challenge, Israeli companies Quantum Transistors and CyberRidge each received approximately €2.5 million to advance quantum-computing and secure-communications technologies. At the scale-up stage, Classiq passed the 2025 EIC STEP Scale Up evaluation and was referred to the EIC Fund for a potential €10–30 million investment, subject to due diligence. Together, these instruments complement collaborative programmes such as QuantERA by supporting Israeli capabilities from frontier research through technology development and commercial scale-up.

Israel's integration into European quantum research ecosystems occurs through both scientific collaboration and participation in large research infrastructures. Israeli partners maintain active roles in European platforms in quantum technologies, graphene, and advanced

computing, helping shape joint research roadmaps and shared testbeds. Cooperation with Germany, Spain, and Italy is particularly strong, making them among Israel's most frequent partners in quantum-related Horizon Europe activity.

At the industry level, Israel's rapidly expanding quantum sector collaborates closely with European corporations, startups and research institutions through ISERD, the Israel-Europe Research & Innovation Directorate, part of the Israel Innovation Authority's International Division. ISERD plays a central role in Israel's participation in EU research and innovation programmes, including Horizon Europe. It coordinates the activities of Israel's delegates to relevant programme committees, disseminates information, promotes industrial cooperation and partnership searches, and provides guidance to Israel's R&I community in industry and academia. [Qubit-IL](#), Israel's quantum industry association, complements this institutional framework by connecting Israeli companies, research groups, investors and government partners with international stakeholders, thereby supporting joint ventures, cross-border pilots and global commercialization pathways.

In addition, companies such as [Quantum Machines](#) engage in international cooperation through technology-integration partnerships and by offering access to heterogeneous quantum testbeds for global researchers. [The Israeli Quantum Computing Center](#) (IQCC), located at Tel Aviv University, provides remote access to multiple types of quantum computers and is positioned as an international research facility intended to serve both Israeli and global users, reinforcing Israel's role as a contributor to worldwide quantum R&D.

Overall, Israel's international engagement in quantum technology is anchored in Horizon Europe, strengthened by bilateral partnerships, and amplified by industry-driven collaboration, positioning the country as an important partner in global quantum research, commercialization, and innovation ecosystems.

U.S.-Israel Quantum Research and Industry Collaboration

Israeli researchers and quantum technology companies maintain research and commercial connections with universities, technology companies and industrial partners in the United States. These activities take place through established bilateral research and development programmes, direct collaboration between research institutions, and technology partnerships between companies. They illustrate how Israeli quantum capabilities are developed and applied within international research and commercial environments.

Joint Research and Industrial R&D

Research collaboration between Israeli and American institutions is supported by established bilateral funding mechanisms. The United States-Israel Binational Science Foundation (BSF), established in 1972, supports joint basic and applied research involving researchers from both countries. In addition, the NSF-BSF joint research programmes enable Israeli researchers to participate in collaborative projects funded by the U.S. National Science Foundation.²³

Industrial R&D cooperation is supported through the BIRD Foundation, which provides funding for joint development projects involving Israeli and American companies. BIRD grants can reach up to \$1.5 million per project and require collaboration between companies from both countries with a defined commercial objective.

One example in a quantum-related field is the collaboration between Israel's AccuBeat

and Colorado-based FieldLine Industries to develop compact, low-power atomic clocks and magnetometers. The project illustrates how established bilateral R&D mechanisms can support the development of specific technologies with potential commercial applications.²⁴

Commercial and Technological Partnerships

Alongside research cooperation, Israeli quantum companies work with U.S. technology firms on the development and integration of quantum computing technologies.

One example is the collaboration between Israel's Quantum Machines and NVIDIA. Their work focuses on combining quantum processor control systems with accelerated classical computing capabilities, supporting applications such as real-time calibration, processor control and hybrid quantum-classical computing.

This collaboration is also reflected in the Israeli Quantum Computing Center (IQCC), established under Israel's National Quantum Initiative and operated by Quantum Machines. The center integrates access to different quantum computing architectures and classical computing resources and was selected as an early deployment site for NVIDIA DGX Quantum.

The example demonstrates how technology developed by an Israeli company can be integrated with computing infrastructure provided by a global technology company to support research, experimentation and the development of quantum computing applications.

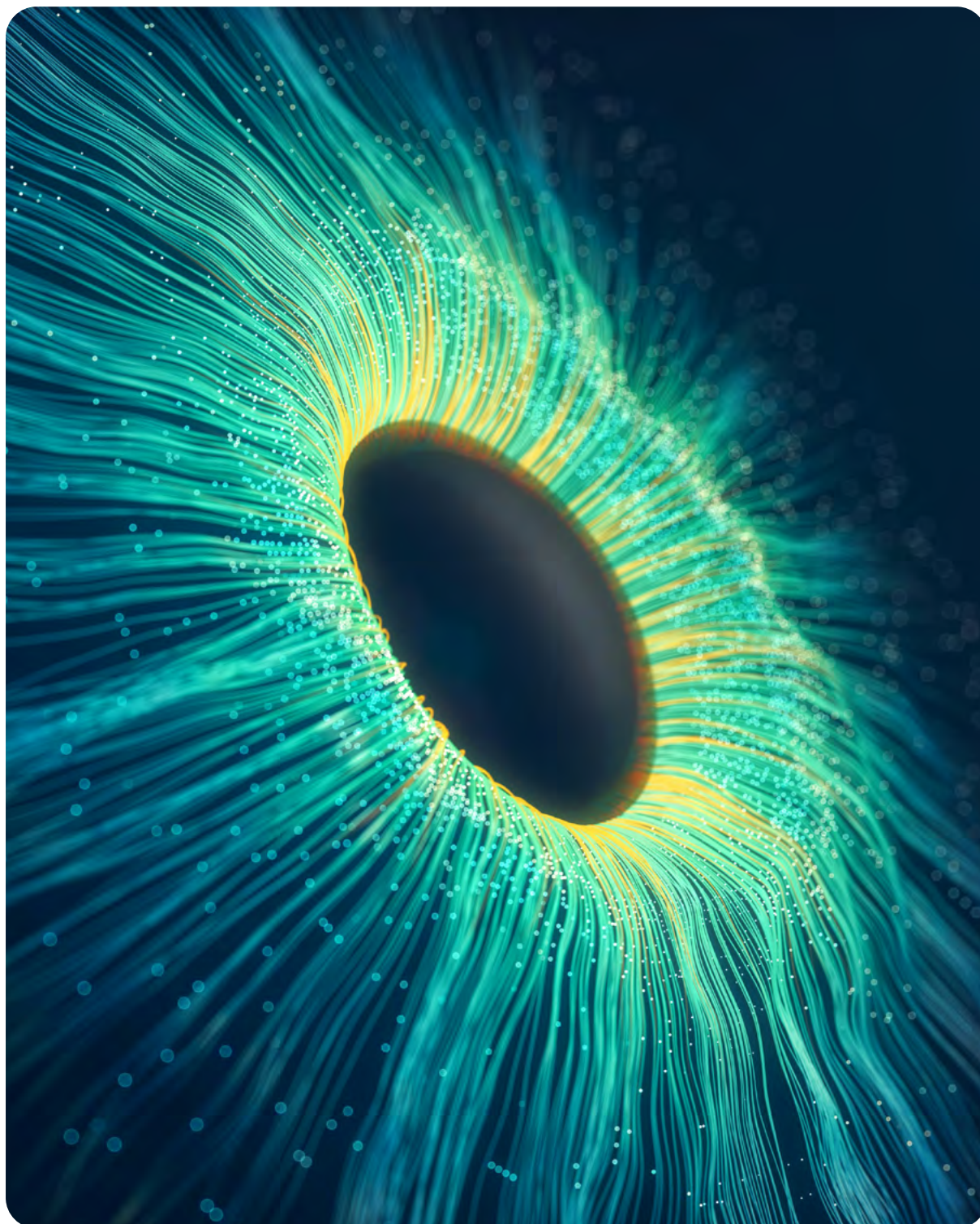
Other Israeli companies, including Classiq and Qedma, develop software capabilities in quantum algorithm design and error mitigation that can be applied across different quantum computing platforms. These capabilities enable Israeli companies to participate in international quantum technology development without relying exclusively on domestic quantum hardware.²⁵

Post-Quantum Cryptography and International Standards

Post-quantum cryptography is another area relevant to Israeli technology companies operating in international markets. In August 2024, the U.S. National Institute of Standards and Technology (NIST) published its first three finalized post-quantum cryptography standards, covering key establishment and digital signatures. These standards provide a technical reference for organizations and technology providers preparing to transition toward quantum-resistant cryptographic systems.²⁶

Israel's established cybersecurity industry provides a foundation for developing quantum-resistant security solutions. Israeli companies and research groups are active in cryptography, secure communications and related cybersecurity technologies.²⁷ For companies developing products for international customers, alignment with emerging technical standards is an important consideration in product development, interoperability and market adoption.

Together, these examples illustrate several existing forms of U.S.-Israel cooperation in quantum-related technologies: joint academic research, publicly supported industrial R&D, and direct commercial and technological collaboration. They also demonstrate how Israeli companies and research institutions participate in international quantum development through established mechanisms and specific technological capabilities.



1.7

Theme 7: Cybersecurity, Privacy and Adoption Readiness in Israel

Israel's cybersecurity foundation and the quantum-safe transition

Israel approaches the quantum-safe transition from the foundation of an established cybersecurity ecosystem with expertise in cryptography, secure communications, threat analysis and enterprise cyber products. This creates a structural advantage: post-quantum

cybersecurity can be developed as an extension of existing national and commercial capability rather than as an entirely new sector.²⁸

Two pathways should be distinguished.²⁸ The first is migration to post-quantum cryptography, including cryptographic inventories, replacement planning and integration of quantum-resistant algorithms into existing systems. The second is the development of quantum communications and quantum key distribution for selected high-security applications.

Israeli academic groups and companies are active across PQC, QKD, quantum networking and quantum-enhanced security applications. A national migration framework for critical infrastructure is currently under development and has not yet been publicly released.

Case Study: Working with Noisy Quantum Systems²⁹

Current quantum computers remain highly sensitive to noise and errors, limiting the reliability of computational results. Israeli companies are addressing this challenge through the software layer. Classiq develops high-level tools that abstract hardware complexity and optimize quantum

applications across different platforms, while Qedma focuses on characterizing and mitigating errors in noisy quantum systems. Together, these approaches illustrate how software can help bridge the gap between emerging quantum hardware and practical, reliable applications.

Adoption of quantum technologies varies significantly across sectors. Defense organizations and advanced communications firms are among the earliest adopters, while healthcare, finance, energy, logistics, and government services will require targeted pilot programmes and stronger integration mechanisms.

Israel is relatively well-positioned for early adoption of quantum technologies, thanks to the strong foundation built during the first national quantum program (2019-2025). Over these years, Israel established a diverse research ecosystem spanning quantum computing, communication, and sensing; created national testbeds and shared infrastructures; and nurtured a rapidly expanding quantum industry with global visibility. The presence of more than twenty active quantum companies, robust academic excellence, and significant international cooperation-particularly through Horizon Europe and bilateral partnerships-gives Israel a strong starting point for integrating quantum capabilities into national needs.

The establishment of the Israeli Quantum Computing Center, structured access to heterogeneous quantum processors, and growing academic-industry collaboration further enhances readiness by creating hands-

on environments for algorithm testing, hybrid quantum-classical workflows, and early development of real use-cases. Government bodies such as the Israel Innovation Authority, MAFAT, and VATAT have already demonstrated the ability to prioritize quantum strategically, ensuring continued funding, talent development, and long-term national planning.

However, readiness remains uneven across sectors. Adoption within non-quantum industries (finance, energy, logistics, health, manufacturing) is still at an early stage, with limited awareness of quantum advantages and few well-defined use-cases.³⁰ While Israel's quantum startups are maturing quickly, many applications are still pre-commercial, making large-scale adoption dependent on global technological progress and supply availability. In critical areas like quantum-secure communication, quantum-safe cryptography, and high-precision sensing, Israel shows strong R&D capacity but limited nationwide deployment.

Overall, Israel is well-prepared from an R&D and ecosystem perspective, moderately prepared in terms of industry readiness, and still developing its capacity for broad national adoption across government, industry, and critical infrastructure.

Key Challenges to Adoption

1. Limited Availability and Maturity of Quantum Hardware

Even with local testbeds, Israel-like all countries-faces reliance on foreign quantum hardware supply chains. Global access remains constrained by export controls, proprietary architectures, and vendor-dominated ecosystems.

2. Need for More Real-World Use-Cases

Most industries have not yet identified or validated quantum-enabled applications with clear ROI. The lack of domain-specific algorithms, benchmark datasets, and pilot environments slows adoption.

3. Talent Shortages and Workforce Scaling

Despite strong academic training programs, demand for quantum engineers, algorithm developers, and hybrid HPC-quantum specialists outpaces supply. Retaining top talent is challenging due to global competition.

4. Integration with Legacy IT and Cyber Infrastructure

Quantum adoption requires updated cloud architecture, secure access protocols, and migration to quantum-safe cryptography. These transformations require high investment and long planning cycles.

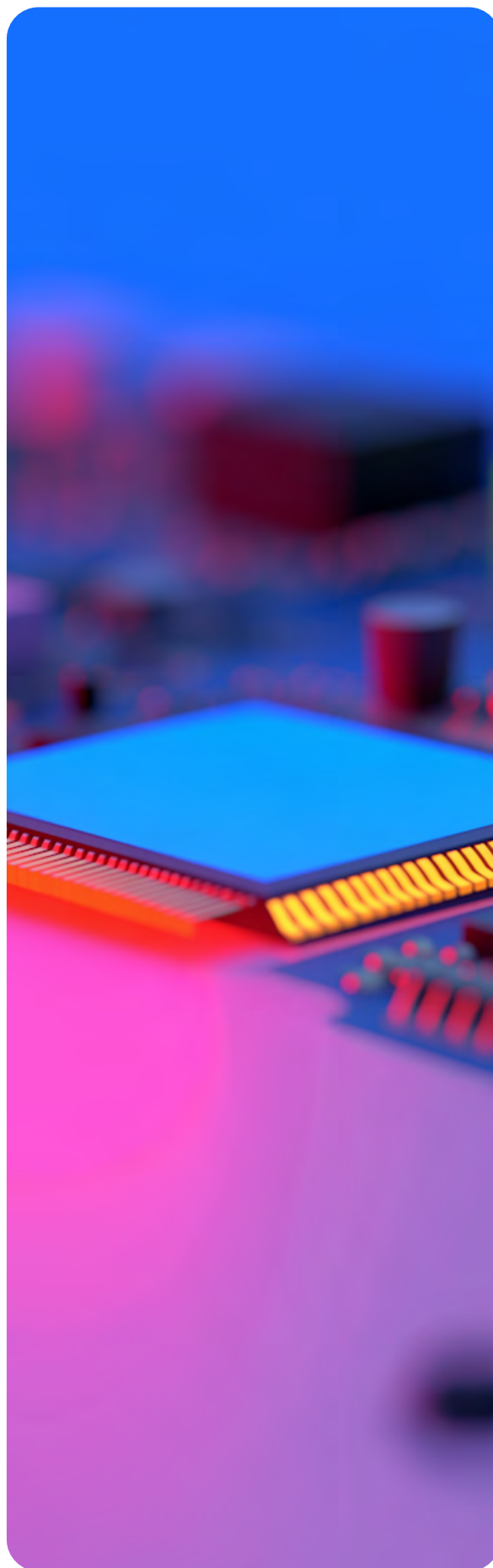
5. Fragmented Industrial Awareness

Outside the quantum sector, many companies lack familiarity with quantum computing timelines, capabilities, and readiness levels. This creates hesitation in initiating pilots or allocating strategic budgets.

6. Ensuring National Security and Strategic Autonomy

Quantum adoption in defense and intelligence requires sovereign capabilities, secured supply chains, and stringent classification protocols-areas that demand sustained investment.

Israel is entering the next phase of national quantum readiness from a position of strength: a globally recognized quantum hub, strong academic foundations, and one of the world's fastest-growing quantum startup ecosystems. However, widespread adoption-across industries, government agencies, and national infrastructure-will require continued investment, better integration of end users, stronger supply-chain security, and accelerated development of practical use-cases.



1.8

Theme 8: Governance, Responsible Innovation and Standardization

In the Israeli context, governance and responsible innovation are expressed less through abstract principles alone and more through the design of collaborative mechanisms that allocate risk, define shared goals, and connect frontier research to public needs. Mission-driven consortia offer a practical example of how public coordination can shape standards, accelerate learning, and guide innovation toward strategic and societal value.

Programme governance and management

The first programme demonstrated that coordination among funding bodies can support budget allocation and broad strategic alignment. However, the National Committee's review identified the absence of a dedicated national programme-governance body as a significant structural gap. No single entity held operational responsibility across programme implementation, international engagement, ecosystem monitoring and state-level business development.³¹

The Committee therefore recommended establishing a dedicated management body for the second programme. Its proposed role would include programme coordination, periodic ecosystem assessment, international partnerships, standards engagement and the development of demand-side activity.³²

Alongside the dedicated national programme-management body, ecosystem organizations can support implementation by convening

industry, academia, investors and government stakeholders around shared priorities. Qubit IL, Israel's quantum industry association, already contributes to this broader ecosystem role through community-building, awareness activities, talent-development programmes and engagement with public-sector stakeholders. These activities complement, rather than replace, the dedicated national governance and programme-management functions recommended by the National Committee.

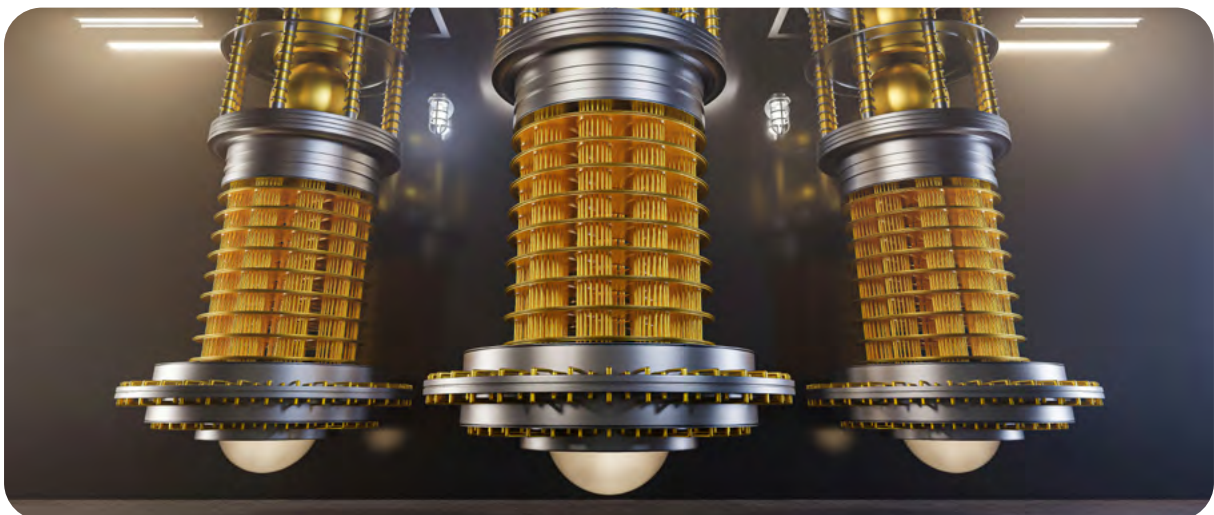
Quantum consortia

The goal of the Israel Innovation Authority's Consortia Program is to develop generic breakthrough technologies and enhance Israel's competitive advantage in emerging technologies. The incentive program funds infrastructure technologies, and enables shared knowledge and collaboration between companies operating in the same field.

The Quantum Sensing Consortium represents an effective model for mission-driven R&D. It brought together AccuBeat, Rafael, IAI/ELTA, OPSYS Technologies, and leading university groups to develop next-generation sensing systems.³³

The consortium demonstrated the potential of coordinated academic-industrial collaboration to advance high-performance quantum sensing technologies.

The consortium was created to bridge a long-standing gap between world-class academic research in quantum physics and the operational needs of Israel's defense, aerospace, and high-tech industries for ultra-precise sensing technologies. By bringing together leading universities, government laboratories, and industrial companies, the consortium created for the first time in Israel a complete innovation pipeline spanning fundamental physics, device engineering, and real-world deployment.



Throughout its multi-year activity, the consortium delivered major breakthroughs across several sensing modalities, including quantum magnetometry, gravimetry, and precision timing. Academic teams contributed advances in atom-based sensors, solid-state spin systems, laser stabilization, and low-noise quantum readout techniques, while industrial partners focused on miniaturization, packaging, ruggedization, and field-ready integration. Defense stakeholders provided real operational requirements, enabling the systems developed in the consortium to be benchmarked not only against laboratory standards but also against mission-level performance targets. These coordinated efforts produced prototype devices that significantly outperformed classical sensing technologies, opening new possibilities for navigation without GPS, subsurface mapping, inspection tools, and national-security applications.

A particularly important outcome of the consortium was the creation of new human-capital capacity in one of the most talent-intensive fields in quantum technology. Dozens of physicists, engineers, algorithm developers,

and system designers were trained on real quantum hardware and integrated sensing systems. Many of these specialists now hold key positions across Israel's growing quantum startup ecosystem, defense R&D units, and advanced industrial laboratories. This workforce impact—often overlooked in traditional evaluations—has become one of the consortium's most enduring contributions to Israel's long-term technological resilience.

Beyond technology development and workforce creation, the consortium also built shared infrastructure, testing methodologies, and early standards for quantum sensing systems in Israel. These assets now support additional applied-research consortia, national pilot programs, and collaborations between academia and industry. The consortium's success has become a reference model within the Israel Innovation Authority: a demonstration that multi-stakeholder, high-risk, high-impact quantum R&D can reduce barriers, accelerate translation from research to products, and generate measurable strategic benefits for the state.

1.9

Theme 9: Sustainability and Long-Term Ecosystem Resilience

Sustainability in the quantum economy should be understood not only in environmental terms, but also as the long-term resilience of talent pipelines, infrastructure maintenance, financing continuity, trusted international partnerships, and balanced access to enabling resources. For Israel, long-term ecosystem resilience will depend on maintaining continuity between national programmes, preserving academic excellence, reducing bottlenecks in critical supply chains, and ensuring that public investments continue to translate into durable scientific and industrial capacity.

Supply-chain and ecosystem resilience

Israel remains dependent on international supply chains for several critical quantum inputs, including specialized materials, substrates, cryogenic systems, fabrication tools and advanced hardware components. Full domestic self-sufficiency is neither realistic

nor necessarily desirable. The relevant policy objective is selective technological sovereignty: identifying the components and capabilities that are strategically critical, supporting domestic capacity where Israel holds a credible advantage, and securing reliable international access elsewhere.³⁴

Environmental sustainability

Environmental sustainability has not yet been developed as a structured component of Israel's national quantum programme. Future work could include energy benchmarking of quantum systems, sustainability criteria for national infrastructure and support for quantum-enabled applications addressing energy, climate and resource-efficiency challenges.³⁵





2 | Blueprint in Practice

The preceding themes describe the building blocks of Israel's quantum economy. This section translates those building blocks into an applied national case, showing how governance,

infrastructure, scientific capability, industrial growth, and strategic coordination interact in practice within a small yet highly concentrated innovation system.

Table 1: CROSSWALK SUMMARY AGAINST THE NINE BLUEPRINT THEMES

Blueprint theme	Summary of Israeli activity (current and planned)	Convergence
1. Transformative capabilities	Structured national assessment by the National Committee in late 2025. Implicit value-chain logic in consortium structure.	Strong
2. Hardware infrastructure and supply chain	Active companies across all major modalities. IQCC for multi-modality access. Materials gap acknowledged.	Partial
3. Open innovation and commercialization	Three companies have raised over USD 100M each. Cumulative capital raised exceeds USD 1B.	Strong
4. Creating awareness	Limited national activity in first program. National Committee identifies as priority gap for second program.	Convergent
5. Workforce development	Targets of approximately 225 faculty groups and 600 doctoral students by 2031.	Strong
6. National and economic security	Demand-pull from sophisticated consumers. Short feedback loops. Real-world use cases in PNT, sensing, communications.	Strong
7. Cybersecurity and privacy	Strong commercial base via the cybersecurity industry. PQC and QKD active. National migration plan pending.	Strong / Partial
8. Governance, responsible innovation, standardization	No dedicated management body in first program. National Committee's central recommendation for second program.	Strong
9. Sustainability	Not yet a structured component of the national quantum program.	Limited

Source: Authors' analysis. Detailed crosswalk in Appendix B.

Crosswalk against the Quantum Economy Blueprint

Two observations emerge from mapping Israel's activity against the Blueprint's nine themes. First, Israel shows strong or partial convergence in seven areas, particularly commercialization, infrastructure, workforce, cybersecurity and national-security demand. This suggests that countries responding seriously to the quantum challenge often converge around similar enabling conditions, even when their strategies are developed independently.

Second, the main remaining implementation gaps are in dedicated programme management and sustainability. In both areas, the Blueprint provides a useful diagnostic framework for priorities that have been identified but are not yet fully embedded in Israel's national quantum programme.³⁵

2.1 Responsibility-based: who initiated the strategy?

Israel's quantum strategy did not emerge from a single institution alone, but from coordinated action among several public actors with distinct mandates. The initial national push was shaped by the combined roles of the Planning and Budgeting Committee (VATAT), the Israel Innovation Authority, MAFAT, the Ministry of Science, and the Ministry of Finance, together with leading universities and defense-oriented research communities. This distributed responsibility model reflects the structure of Israel's innovation system: academia builds scientific depth, government de-risks frontier investment, defense bodies articulate strategic needs, and industry translates emerging capability into commercial momentum.

2.2 Geographic-scope-based: national implementation model

Unlike large countries that may build quantum capacity through multiple regional hubs, Israel operates through a compact

national model in which geographic concentration becomes a strategic advantage. Research universities, startups, defense laboratories, investors, and national infrastructure are located within a relatively dense ecosystem, enabling fast coordination, short feedback loops, rapid talent mobility, and shared use of expensive facilities. In practice, this means that quantum strategy in Israel is implemented nationally, but with the agility and interconnectedness often associated with a single innovation cluster.

2.3 Applied ecosystem lessons from Israel

Israel should expand its quantum talent-development pipeline through engineer retraining, graduate-level programmes, and specialized laboratory training aligned with national infrastructure.

Priority should also be given to strengthening domestic capabilities in photonics, cryogenics, and fabrication tools in order to improve long-term resilience and reduce strategic dependency.

Israel's future government strategy for quantum technologies should build on the lessons of the first national programme and on the growing recognition of quantum science as a driver of both economic competitiveness and national security. The overarching goal of a second national programme should be to steer the development of scientific and technological capabilities in a way that ensures long-term economic benefit for Israel and its citizens while safeguarding and extending the technological edge that underpins national defense.

To translate this vision into actionable policy, several strategic vectors stand out: deepening international cooperation while the current window of opportunity remains open; securing robust and resilient supply chains for quantum computing and enabling components; strengthening academic excellence and reinforcing the role of academia in supporting industry and security missions; prioritizing quantum software and algorithms as a core national capability; encouraging non-quantum industries and defense organizations to develop use cases and conduct early experimentation; expanding the training and retention of a highly skilled workforce; and conducting periodic assessments of the quality and maturity of Israel's academic and industrial quantum ecosystem.



3 | Conclusion and Next Steps

Israel's quantum journey demonstrates how a relatively small country can build outsized capability through focused public investment, scientific excellence, mission-driven coordination, and tight linkages between academia, industry, and national need. The next stage will require moving from ecosystem formation to scaled implementation: deepening industrial adoption,

securing critical infrastructure and supply chains, strengthening talent pipelines, and converting early leadership into durable economic and strategic advantage. In that sense, Israel offers not only a national success story, but also a practical model for how concentrated innovation systems can participate meaningfully in the emerging quantum economy.



Appendix

Appendix A Company directory

AccuBeat –

atomic clocks and precision timing.

Classiq –

high-level quantum software for algorithm design and synthesis.

Heqa Security (QuantLR) –

quantum key distribution.

IAI/ELTA –

quantum magnetometry and advanced sensing.

LightSolver –

optical and quantum-inspired computing.

OPSYS Technologies –

photonic sensing.

Q-Factor –

neutral-atom quantum computing.

Qarakal –

superconducting quantum devices and cryogenic systems.

Qedma –

quantum error mitigation and noise characterization.

Qiz Security –

post-quantum cryptography.

QuamCore –

superconducting quantum processors.

Quantum Art –

trapped-ion quantum computing technologies.

Quantum Machines –

quantum control and orchestration systems.

Quantum Pulse –

photonic quantum components.

Quantum Source –

photonic quantum computing technologies based on deterministic single-photon generation.

Quantum Transistors –

diamond-based quantum computing and silicon photonics.

Quantimize –

quantum machine learning and optimization.

Raicol –

electro-optic crystals and photon-source components.

Rafael –

quantum sensing and gravimetry.

Tabor –

control electronics for quantum computing.

Appendix B

Detailed crosswalk against the nine Blueprint themes

The detailed crosswalk expands each row of Table 1 with current state, planned direction, gap assessment, and convergence rationale. Theme-level descriptions follow the Blueprint's own definitions.

Theme 1: Transformative capabilities

Current state. Structured national assessment conducted by Israel's National Committee on the Second Quantum Program in 2025, drawing on questionnaires to university presidents and company CEOs, meetings with quantum-technology consumers, and bilateral discussions with international counterparts. Implicit value-chain logic in the consortium structure.

Planned direction. Formal value-chain analysis explicitly identified as a priority. Periodic quality assessments of the academic and industrial ecosystem written into the second program design.

Gap assessment. Value-chain analysis was implicit rather than systematic in the first program. No published national value-chain map.

Convergence with Blueprint. Strong. The National Committee's 2025 review parallels the Blueprint's self-assessment logic, conducted independently.

Theme 2: Access to hardware infrastructure and supply chain

Current state. Domestic companies active across superconducting, trapped ion, photonic, neutral atom, and NV-center modalities. The IQCC provides multi-modality access for research and training. Coverage across most layers of the stack.

Planned direction. Explicit prioritization of supply-chain resilience in photonics, cryogenics, and fabrication tools. Infrastructure for testing and characterizing domestic quantum cores planned.

Gap assessment. Quantum materials remain a genuine gap. Hardware supply-chain dependence persists, as it does for nearly all countries outside a small group.

Convergence with Blueprint. Partial. Stack coverage is unusually broad for an economy of Israel's size. The materials gap and supply-chain mapping are areas where the Blueprint's framework is directly useful.

Theme 3: Open innovation and commercialization

Current state. Israel Innovation Authority consortium model in quantum computing, photonic technologies, and communications. Israel has developed an industrial ecosystem spanning quantum hardware, software, control and orchestration, sensing, and quantum communications and security. Particular strengths are visible in software and control, including companies such as Quantum Machines, Classiq and Qedma, alongside activity across multiple hardware modalities and emerging AI-quantum applications.

Planned direction. Continued Israel Innovation Authority consortium funding. New programmes to support multinational corporation R&D centres in Israel. Explicit support for non-quantum industries developing use cases and for stronger commercialization pathways connecting academic research, national infrastructure and industry.

Gap assessment. Industry awareness outside the quantum sector remains limited. Few validated commercial use cases have reached broad deployment, and the pre-commercial nature of many applications continues to limit demand-side pull.

Convergence with Blueprint. Strong. The commercialization pipeline, cross-sector consortia and academia-industry linkages align naturally with the Blueprint's emphasis on technology transfer, commercialization and ecosystem development.

Theme 4: Creating awareness

Current state. Awareness-building activity has expanded beyond academic and industry conferences. Qubit IL now supports quantum literacy and ecosystem engagement through programmes including Quantum Fellows, workshops, the national Quantum Hackathon, an accelerator and international exposure of Israeli quantum companies. National infrastructure such as the IQCC also supports awareness by providing hands-on access to quantum systems.

Planned direction. Awareness and demand-side engagement are explicitly identified as priorities for the next phase. The direction includes structured engagement with decision-makers, industry users and international partners, alongside stronger communication of national quantum capabilities.

Gap assessment. Awareness building was not a major funded priority in the first programme, and structured engagement among industries outside the quantum sector remains at an early stage.

Convergence with Blueprint. Convergent. The Blueprint's emphasis on multilevel public dialogue, decision-maker education and ecosystem awareness closely matches the direction now emerging in Israel.

Theme 5: Workforce development

Current state. Substantial faculty recruitment and growth in academic quantum personnel took place during the first programme, supported by Planning and Budgeting Committee investment and expanded national infrastructure. Joint academic-industrial training and direct movement of researchers and graduates into quantum companies support a close link between research and industry.

Planned direction. Targets include approximately 225 core faculty groups in QST and 600 active doctoral students by the end of the second programme, alongside additional groups in algorithms and software and continued retraining programmes for transition into quantum-related industry roles.

Gap assessment. Demand for quantum engineers, researchers, algorithm developers and hybrid quantum-classical specialists continues to outpace supply. Retention pressure remains significant because of global competition for quantum talent.

Convergence with Blueprint. Strong. Quantitative workforce targets, academic expansion and industry-oriented training closely parallel the Blueprint's workforce-development theme.

Theme 6: National and economic security

Current state. National-security and advanced-technology users function as demanding early adopters with concrete operational requirements, generating short feedback loops between end users and developers. Use cases under development include positioning, navigation and timing in environments where satellite navigation is unavailable, sensitive detection, imaging and secure communications. Quantum sensing technologies such as those developed by AccuBeat illustrate the movement from research toward operational applications. Israel also participates in international validation and research cooperation with partners in Europe, the United States and Asia.

Planned direction. Continued development of use-case-driven validation across sensing, communications and computing; strengthening international cooperation; and improving resilience in critical infrastructure and supply chains.

Gap assessment. A standalone national economic-security framework specific to quantum is not yet articulated separately from broader innovation, security and industrial policy.

Convergence with Blueprint. Strong on the demand-pull and feedback-loop dimensions, partial on the framework dimension. The Blueprint's framing of dual-use applications and demand-creating procurement aligns closely with how Israel's ecosystem already operates.

Theme 7: Cybersecurity and privacy

Current state. Israel's broader cybersecurity industry provides a strong commercial foundation for the quantum-safe transition. PQC research is active in academia and industry, while companies are active in QKD, quantum communications and quantum-enhanced security applications.

Planned direction. Continued integration of quantum-safe approaches into cybersecurity products, international cooperation on standards, and preparation for broader migration toward post-quantum cryptography. A national migration framework for critical infrastructure is currently under development.

Gap assessment. A national-level migration framework has not yet been publicly released, and coordination across sectors will be required as global PQC migration accelerates.

Convergence with Blueprint. Strong on commercial and research capability, weaker on the national policy framework. The Blueprint's structured approach to cryptographic readiness is directly applicable to the next phase of Israel's programme.

Theme 8: Governance, responsible innovation and standardization

Current state. Multi-agency coordination supported the first programme through the principal public funding bodies, but no dedicated programme-management body held operational responsibility across implementation, ecosystem monitoring, international engagement and demand-side development.

Planned direction. The National Committee's central recommendation is to establish a dedicated national programme-management body, organizationally distinct from any individual funding agency. The proposed direction also includes stronger international cooperation, standards engagement, ecosystem assessment and demand-side activity.

Gap assessment. The absence of a dedicated programme-management body was identified as a significant structural gap in the first programme. Responsible-innovation frameworks specific to quantum also remain underdeveloped.

Convergence with Blueprint. Strong. The Blueprint's governance theme directly addresses needs independently identified by Israel's National Committee, particularly around programme coordination, implementation and standards engagement.

Theme 9: Sustainability

Current state. Sustainability is not yet a structured component of Israel's national quantum programme. Long-term ecosystem resilience is addressed indirectly through talent development, infrastructure investment, supply-chain resilience and international partnerships.

Planned direction. Sustainability is not currently a named priority in the proposed second programme, although future work could include energy benchmarking of quantum systems, sustainability criteria for national infrastructure and quantum-enabled applications addressing energy and resource efficiency.

Gap assessment. Sustainability metrics, energy benchmarking for quantum systems and incentives for sustainability-oriented use cases are not yet part of the Israeli framework.

Convergence with Blueprint. Limited. This is one of the areas where the Blueprint offers the clearest forward-looking guidance for Israel.

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Acknowledgements

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Endnotes

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