QuIC's recommendations on Scaling the European Quantum Industry

POSITION PAPER

How European companies reach competitive size and stay European

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Executive Summary

WHAT THIS PAPER ARGUES Europe has built a quantum industry. The next step is companies at global scale, with their control, the value they create and the assets they hold staying in Europe. Companies get there by winning customers and raising capital, and a government can supply both conditions.

The European base is strong. Europe hosts around a third of the world's quantum companies and supplies close to half of the quantum hardware and software components used worldwide. Its research base is first-rate, and its enabling-technology companies lead their global markets. What is missing is scale in the platform layer, where the machines themselves are built, and capital access on the terms American and Chinese competitors enjoy. Closing that gap is the next step, and when European companies reach that size, their control, the value they create and the assets they hold have to stay in Europe.

A company reaching that size needs a market and it needs capital. European public buyers already purchase quantum systems, but in units of €8 to €12 million, and against decisions that take a year. Europe attracts around 5% of the private money invested in quantum worldwide, and almost none of its companies has listed equity to pay with.

Meanwhile the assets have been moving. In eighteen months IonQ of the United States made four acquisitions. It bought a British quantum-processor developer for $1,075 million, paid almost entirely in its own listed shares. It took control of Switzerland's pioneer in quantum-secure communications. It acquired an American semiconductor foundry. The enabling layer has been moving as well. Hamamatsu of Japan acquired NKT Photonics of Denmark. Quantum Design of the United States acquired Oxford Instruments' NanoScience division and Qnami of Switzerland. All four are enabling-technology companies, in the layer where Europe leads commercially.

One part of the capital picture changed in 2026. IQM listed on Nasdaq in July at a reported $1.9 billion and Pasqal in August at about €1.7 billion pre-money. Both raised their capital in New York.

The central finding of this paper is that Europe's quantum industry has a demand problem and a capital-depth problem, not a corporate-structure problem. European companies with commercial standing already acquire other companies, without designation and without bespoke public structures. Companies without it cannot be made into acquirers by transaction design, and combining two companies that both lack demand and capital produces a larger company that still lacks them.

The constraints are demand and capital depth. Public buyers commit at a fraction of the scale and speed of their American counterparts. China has opened its public markets to loss-making quantum companies. European equity markets are shallower, and public instruments write individual cheques far below what a transaction requires.

What scaling requires differs by pillar. Sensing and enabling technologies scale on applications, qualification and volume. Communications scales on deployed infrastructure and certification. Computing scales on capability milestones and the capital to reach them.

Fabrication access decides what can actually be built. No European quantum company is large enough to justify its own fabrication, packaging and test capacity. The lines that exist belong to customers who demand exclusivity, or to research institutes that rarely cede operational control.

Five recommendations follow. They are costed over five years, and almost the whole envelope is procurement.

- **Make the state the first customer.** Public institutions should become first-instance buyers of quantum systems. Awards should be competitive and multi-vendor, judged against published benchmarks, staged, and ending in a purchase commitment. Procurement converts policy into commercial revenue. Revenue produces the valuations, capital access and balance sheets that make a company a credible acquirer. €7,700 to 12,300 million over five years.
- **Deepen the capital base, and change how public money is governed.** The depth of a market decides what a company can raise and what it can pay with. Institutional and corporate capital does not reach the sector today. Public vehicles that require a private lead investor cannot move first. No new money is required.

- **Lend against contracted public revenue.** A signed public contract is security a lender can price. Lending against it turns demand into capital, without diluting founders. €1,000 to 2,000 million.
- **Apply reciprocity in purchasing and investment.** Prefer domestic suppliers when purchasing, as every other major jurisdiction already does. Remain open when invested in: foreign capital sustains the rate of company formation that any scaling strategy needs. That standard also protects domestic acquirers, who need those markets open to them. No cost.
- **Monitor the market.** Track who is acquiring whom, and which assets change hands. A decision to act should rest on evidence rather than on anecdote. No cost.

Every one of these recommendations has to select between applicants, and revenue is the criterion an instrument will default to. It is the right test of who can acquire, and the wrong test of who should receive support. Revenue arrives at different moments in different pillars, for reasons unrelated to prospects. Revenue won in competition evidences capability; revenue allocated administratively evidences a relationship. Sensing and enabling technologies earn most and raise least. Computing earns least and raises most. A revenue test would send support to the companies that need it least.

A government cannot conjure private demand, but it can buy what it needs itself, which gives a company its first revenue and a reference sale. It can also build the conditions for private demand to follow: capital markets deep enough to price a company, and rules that move at the speed of a transaction. The criteria, the procurement design and the eligibility rules are being settled now, ahead of the legislation that will eventually anchor them. Almost everything recommended here can be implemented with instruments that already exist, so what matters is how those instruments are designed.

The roadmap phases the effort over five years. Almost the whole envelope is procurement, which buys the industrial capability it needs through competitive award, with debt secured against contracted public revenue. Support is concentrated through milestone-based competition rather than assigned in advance. The money exists. What is missing is a customer, market depth, and speed.

1. Why Scaling, and Why Now

Europe built this industry over the last decade and the build worked. The EU hosts around a third of the world's quantum technology companies, the largest concentration of quantum-trained people anywhere, world-leading academic groups and expanding public infrastructure, with national programmes exceeding €11,000 million over five years when EU and Member State commitments are combined, and its enabling-technology companies lead their global markets commercially. What it does not yet host is a quantum company with the scale, balance sheet and market visibility to compete for global customers, global talent and global capital. Producing one is the work of the next phase.[1]

The sector has four pillars and they are not one market. Sensing and metrology is closest to deployment: inertial, gravimetric, magnetometric and optical instruments cost between roughly €10,000 and €100,000 per device and are already in operational use, with public buyers that exist today in navigation, survey, water quality, energy networks, healthcare, transport and defence. Enabling technologies, the cryogenics, lasers, control electronics and photonic components that every quantum programme in the world buys, is where Europe leads commercially and where its companies already earn international revenue.

Communication and security has European origination and a funded transition to post-quantum cryptography, and its gating factor is certification rather than performance. Computing and simulation is furthest from a finished product and attracts the large majority of the capital: of roughly $12.6 billion invested in quantum start-ups worldwide in 2025, about 90% went to computing. Machines cost tens of millions and will sit in data centres alongside classical high-performance computing, which is where European public infrastructure is already placing them. The pillar that earns is not the pillar that raises, and an instrument built on one pillar's pattern would misread the others.

The case made within the sector is that consolidation is a mechanism that creates companies of scale and strength and protects the ecosystem from foreign acquisition. It has been put to QuIC members and the question is live as the Quantum Act is prepared. This paper agrees with the objective and disagrees with the diagnosis: Europe needs larger quantum companies, but combining the existing ones is not what would produce them right now.

Scaling needs to happen and current events could argue that it is happening today in the quantum world through acquisition. In the past months only, to take one example:

- **Oxford Ionics (UK)**: acquired by IonQ (US) in 2025 for $1,075 million, of which $1,065 million was paid in IonQ listed shares and only around $10 million in cash. The highest-value acquisition of any Oxford quantum spinout, financed almost entirely with stock.[2]
- **ID Quantique (Switzerland)**: majority stake taken by IonQ in 2025; Europe's pioneer in quantum key distribution and single-photon detection now consolidated into a US platform.[3]
- **Qubitekk and Lightsynq (US)**: absorbed by IonQ in the same window, completing a roll-up across computing, networking and photonics in under two years.

This series of acquisitions was executed by one scale-up. Not IBM, not Google, not a defence prime: a quantum scale-up using its listed equity as currency.[4]

Acquisition runs on currency. IonQ's acquisition capacity was not earned by trading revenue. It went public early, through a SPAC, at a valuation that substantially preceded its commercial performance; the resulting listed equity became an acquisition currency; and it is now, in part, acquiring revenue in order to grow into the valuation that currency implies. Capital access produced the commercial position.

Scaling the European industry, and giving it the currency to acquire, rests on conditions Europe can create rather than on transactions Europe can arrange. A company earns acquisition currency by having customers that pay it and a market that prices it, and neither comes from a deal. Both come from the environment the

[1] Quantum Europe Strategy, European Commission, 2 July 2025.

[2] IonQ press releases and SEC filings, 2024 to 2026.

[3] Quantum Europe Strategy, 2 July 2025; Commissioner Henna Virkkunen, public remarks, 2025.

[4] IonQ and Oxford Ionics joint announcement, 9 June 2025 (SEC Form 8-K, Exhibit 99.1); completion September 2025.

company operates in. That environment is what the rest of this paper is about: a public customer that buys at scale, capital markets deep enough to price a European company, and instruments that can act while an opportunity is still open.

2. Scaling Quantum Companies in Europe: What Stands in the Way

The obstacles to scaling are commercial and structural before they are transactional, and a company needs those foundations in place before it can acquire anything. They are presented in order of consequence. Demand and capital depth come first, because they determine whether the rest can be solved at all. The others either follow from those two or are execution risks that standard practice already knows how to manage.

2.1 The demand problem

European public buyers already buy quantum systems, and what is missing is the scale and the speed at which they commit. Europe buys in units of €8 to €12 million, against decisions that take a year. The United States places federal and defence orders that are orders of magnitude larger, and they put a revenue floor under American deep-tech companies at this stage. China has moved on a different lever, opening its public markets to loss-making quantum companies, which §2.2 sets out.

The United States has chosen demand and China has chosen capital access. Europe has not yet chosen either at that scale. A US quantum company can build a commercial trajectory on government demand while its private market matures; a Chinese one can raise on a public market that asks nothing about revenue. Its European equivalent sells into pilots, proofs of concept and research budgets, and returns to the grant cycle when they end.

The consequences compound. Without a customer, a company has no revenue; without revenue, it has no defensible valuation, no debt capacity, no acquisition currency, and no answer to the question every institutional investor asks about the sector. Each of the financial problems set out below is, in part, a restatement of this one. A consolidation strategy that addresses the financing of transactions while leaving the demand gap intact is financing the movement of assets between companies that remain, individually and collectively, unable to sustain themselves commercially.

What exists already. European public buyers already procure quantum systems. EuroHPC has bought six quantum computers and co-funded two analogue simulators, every one from a European supplier, with planned investment above €100 million and further procurements running for the Netherlands and Luxembourg. France commits €500 million through PROQCIMA, a staged competition between five French companies run by the Ministry of Armed Forces against milestones in 2030 and 2035. Finland co-created and now operates two quantum computers through innovative procurement.[5]

What is missing is scale and coordination. The EuroHPC machines are research infrastructure procured at between €8 million and €12 million each, which is a useful reference sale and not a revenue base. The Member State programmes are larger but national, and each concentrates on its own suppliers, so a company's addressable public market is its own country rather than the Union. Nothing at Union level performs the function that American federal and defence procurement performs there.

2.2 The market-depth problem

European public equity markets are shallower, less liquid and less well covered by analysts than their US counterparts. A European listing delivers lower multiples and thinner trading than Nasdaq for a comparable company, and the private markets above venture stage are correspondingly thinner.

[5] IonQ corporate announcements, 2024 to 2025.

Depth is not a detail of market plumbing. It sets the price at which any European company can raise growth capital, the terms on which its investors can realise a position, and the value of its shares as a means of payment. The liquidity problem set out next is that same condition seen from the seller's side and from the buyer's.

This is not a quantum problem and it will not be solved by quantum policy. It is the reason the Savings and Investments Union agenda matters more to this sector than any sector-specific instrument, and the reason a transaction architecture that engineers around shallow markets, deal by deal, will always be more fragile than one that helps deepen them. The clearest recent evidence is the behaviour of the companies themselves. When Europe's two leading quantum platform companies raised public capital in 2026, both did so on Nasdaq. One added a Nasdaq Helsinki listing the following day and the other has indicated a Euronext Paris listing, but a secondary European listing does not change where the capital came from or what set the price.

Depth is partly a question of rules. An exchange that will not list a loss-making company cannot price one. That is a rule, not a shortage of capital, and China has changed it. The fifth listing standard on the Shanghai STAR Market imposes no requirement on an applicant's profit or revenue. It was reactivated in June 2025, quantum was named a supported sector in June 2026, and the Shanghai exchange added a quantum category to its application guidelines. CIQTEK was the first quantum company registered under it: its application was accepted in December 2025, approved in June 2026, six months in total, and the shares rose 419% on debut while the company was still loss-making. Origin Quantum and TuringQ are following. Set against six to ten months for an EIC grant and equity decision, and against both European platform companies listing in New

2.3 The liquidity problem: what a seller can accept and a buyer can offer

Whether a European company can buy another tests whether demand and market depth have been fixed. A company with revenue and a currency others will accept can act; a company with neither cannot, and when European companies cannot act, others do. What stops them is liquidity, on both sides of a transaction.

A venture investor holds preferred stock, sits in a fund with a finite lifetime, and answers to limited partners expecting distributions. To sell a position that investor needs cash, or shares that can be sold on soon after. Shallow European markets supply neither reliably, so a plan that offers neither is asking investors to donate their positions to European sovereignty. They will decline, politely, and sell to the first acquirer who wires dollars or delivers listed stock.

Market depth sets what a buyer can offer as well. IonQ paid for Oxford Ionics with $1,065 million of its own listed shares: instantly priced, instantly liquid, accepted by every shareholder on the target's cap table. Until 2026 no European company in the sector could do that.

IQM began trading on Nasdaq on 2 July 2026 and on Nasdaq Helsinki the following day, and Pasqal began trading on Nasdaq on 28 August with about €309 million of cash at closing.[7] Exail has been listed on Euronext Paris throughout. And a profitable private company can simply pay cash, as Rohde & Schwarz, Bluefors and TOPTICA have each done. What remains is one specific case: an acquirer with neither listed equity nor operating cash flow, facing investors who need liquidity rather than paper. That describes most venture-backed quantum companies, which is most of the sector by number.

Acquisition paper is credible only with a listing, or a visible near-term route to one, and a commercial position substantial enough that the paper is worth holding. Neither can be arranged at the moment of a transaction. Where both sides are private there is also no market price, so negotiations run on stale round prices and competing methodologies, which makes transactions slower and more expensive without making them impossible: Rohde & Schwarz and Zurich Instruments, Bluefors and Cryomech, and iXblue and Muquans each agreed a price with no public reference.

2.4 The speed problem: public money arrives late

Europe does not lack public capital. The Scaleup Europe Fund (€5,000 million),[8] InvestAI, the European Tech Champions Initiative[9] and EIC equity, alongside national vehicles, are collectively larger than anything the US government deploys as equity. But the money arrives slowly, committee cycles measured in quarters while commercial windows close in weeks, conditioned by matching thresholds, domicile restrictions and classification questions that can freeze a round for months, and fragmented across national logics.

Public money follows; it does not lead. Apart from the Scaleup Europe Fund, no European public instrument is structured to lead a funding round. Public equity instruments generally require a private lead investor to set the terms and the valuation, and commit alongside it. That is a feature of their mandate rather than a defect to be engineered away. Public capital cannot move first, so it cannot price a company or open a round that private investors then join. And its availability depends on a private lead appearing, which is the thing European late-stage markets are short of. Where a commercial opportunity is genuinely attractive, private capital is usually available for it, including from outside Europe; the case for public speed is not that public money should substitute for absent private interest, but that its conditions should not disqualify it from participating alongside private interest that already exists.

Speed and scale bind together: the money arrives late, and when it arrives no single instrument writes a cheque large enough to matter to a transaction.

[7] EuroHPC Joint Undertaking procurement announcements, 2023 to 2026; PROQCIMA, French Ministry of Armed Forces, March 2024.

[8] China Securities Regulatory Commission, 1+6 package, 18 June 2025; Shanghai Stock Exchange STAR Market listing guidelines, June 2026; CIQTEK registration filings, December 2025 to June 2026.

[9] IQM and Pasqal listing announcements, July and August 2026; IQM half-year report, first half 2026.

How long the instruments actually take. The EIC Accelerator is the Union's flagship instrument for companies at this stage, and a company that applies to it is planning around a decision that may fall in the following calendar year. Proposals submitted to the cut-off of 1 October 2025 produced published winners in February 2026, four months later, and that covers the grant alone. The equity component is slower by design, because due diligence begins after the award decision rather than before it, so selection establishes neither that the investment will complete nor when. The published expectation is a further two to six months to an equity decision, after which terms are negotiated and the money is disbursed separately from the grant. Six to ten months from cut-off to a decision on equity, with disbursement after that, is the planning horizon an applicant has to work with. Time from selection to disbursement is no longer published.

Procurement runs slower still. EuroHPC signed hosting agreements with SURF in the Netherlands and LuxProvide in Luxembourg in December 2024. The Dutch tender closed on 24 October 2025 and no vendor has been announced in the eleven months since. The Luxembourg tender opened nineteen months after the hosting agreement and closed on 1 September 2026.

Programme design moves at the same speed, and sometimes backwards. Three quantum topics opened under the Horizon Europe Cluster 4 work programme on 15 January 2026 with a deadline of 15 April. The next day a Council Regulation enlarged the EuroHPC mandate to cover quantum. The topics were suspended before their deadline, the submission platform was closed, and applicants with proposals in progress were informed individually. The same

2.5 The fragmentation problem

Multiple tax regimes, employment law regimes and national screening procedures make a multi-country share-for-share merger a legal expedition. Employee option schemes do not port cleanly across borders, and key staff can be materially disadvantaged by a transaction that is good for the company.

Taxation, labour law and social security remain national competences, and are unlikely to change on the timescale of the Quantum Act. Realistic remedies work within them: harmonised employee equity through a common corporate vehicle, and once-only rather than repeated ownership and control assessments.

Two forms of fragmentation deserve to be named more directly, because both obstruct European consolidation specifically: not consolidation in general.

European companies are obstructed when buying other European companies. The debate over screening is conducted almost entirely as a question about third-country acquirers. In practice, a European company acquiring in another Member State can encounter national protectionism of exactly the kind the single market exists to prevent, and completing such a transaction may require intervention at ministerial level. This is not a hypothetical: it has happened in this sector, in a transaction between two Union companies in the enabling-hardware layer. A policy framework that screens hard against foreign buyers while tolerating intra-European obstruction produces the worst available outcome: the asset stays in Europe but cannot be consolidated, and the European buyer learns that acquiring outside the Union is administratively simpler than acquiring inside it.

The comparison makes the asymmetry plain. A non-European acquirer of a European quantum company faces mandatory foreign investment screening in Germany, France, Italy, Austria, Belgium, Denmark and the Netherlands, with triggers commonly as low as 10% of shares. Twenty-four Member States now operate a screening mechanism, and the number of transactions formally screened across the Union has nearly quadrupled since 2020, from 362 to 1,286 in 2024, out of some 3,100 reviewed.[11] Two European companies merging face essentially none of that, and are instead exposed to national merger thresholds and call-in powers that vary between Member States. The Union has built a coherent regime for transactions from outside and left transactions inside the single market to twenty-seven separate systems.

Regional and national equity creates lock-in. Startups that have taken regional or national public equity frequently find their ability to expand into neighbouring Member States constrained by the terms of that funding, whose sponsors have an interest in activity remaining where the money came from. The consequence is that the earliest public money a company takes can determine the geographic ceiling on its growth. European-level funding does not carry the same interest and is, for this reason, structurally more useful to a company intending to operate across the Union: an argument for Union instruments that has nothing to do with their size.

2.6 Merger filing friction

European quantum revenues are measured in single-digit millions, and EU merger control begins at €5,000 million. It does not reach these transactions. The Merger Regulation is a turnover test: Article 1(2) requires combined worldwide turnover above €5,000 million together with EU turnover above €250 million for each of two parties, and the alternative test at Article 1(3) is cumulative across four limbs. IQM, which listed in July 2026 at a reported $1.9 billion, reported revenue of €8.9 million in the first half of that year, so the combined turnover of any two European quantum companies is two to three orders of magnitude below the entry point. No European quantum transaction has had Union dimension. The friction that does exist is national.

Germany and Austria operate transaction-value thresholds that can catch deals with little turnover. Germany's requires acquirer worldwide turnover above €500 million and a transaction value above €400 million; two judgments of the Higher Regional Court of Düsseldorf in February 2025 confined it to cases where low turnover misrepresents competitive potential, which is

[11] European Tech Champions Initiative, EIF and EIB Group, 2023 and 2026.

the category quantum falls into. Austria's equivalent sets combined worldwide turnover above €300 million and transaction value above €200 million.[12] Around ten Member States hold call-in powers over transactions below their thresholds, with Italy by far the most active and a six-month window after closing, matched in Hungary.

The referral route has been unsettled since the Court of Justice ruled in September 2024 that the Commission cannot accept an Article 22 referral from a Member State without jurisdiction under its own rules. The Commission revised its approach and now accepts referrals from States with a call-in power, or with no merger regime at all. Nvidia and Run:ai reached the Commission only because Italy called the transaction in and then referred it.[13]

For a European quantum company of forty people with no in-house counsel, the cost is multi-jurisdictional filing analysis across regimes with heterogeneous thresholds, a six-month reopening shadow in two Member States after closing, and an unsettled referral environment. That is a real friction and it operates inside the single market. It is not a barrier: no European quantum transaction has been prohibited, conditioned, sent to Phase II, or on the public record notified to the Commission at all.

A structural question sits underneath it, and it is live rather than settled. Competition analysis assesses a transaction against the market as defined today; industrial policy asks what capability it creates for a market that does not yet exist. The Commission's draft revised Merger Guidelines, published on 30 April 2026, are an attempt to bridge exactly that gap.[14]

2.7 The weak-merger trap

Consolidation is not arithmetic. Merging several sub-scale companies without product-market fit produces one large company without product-market fit, plus integration costs, culture clashes and founder-ego wars.

The economic case for consolidation is older than this sector and its record is mixed. The argument that scale is needed to compete internationally, and to avoid being acquired, has been made in cluster economics for decades and was made in European cloud computing within the last one. It is not wrong, but it is not self-evidently right either, and the sectors that have tested it offer warnings as well as encouragement.

Banking is the case that should be held in view, because it is the one where consolidation policy succeeded on its own terms. Institutions were encouraged to combine, they did, and the resulting concentration produced firms whose failure the system could not absorb. The lesson is not that consolidation is wrong. It is that a policy which treats scale as the objective, rather than as a by-product of commercial strength, produces concentration without resilience. In a sector where four pillars depend on a single enabling layer, that risk is present in a specific form, which is why the safeguards on non-discriminatory supply matter as much as the encouragement to consolidate.

The European temptation to design inclusive consolidations, in which every Member State's companies are folded in for political balance, must be resisted explicitly, and this is not only a drafting caution. There is a documented risk that consolidation-driven policy encourages transactions that are politically desirable but not commercially justified, and deep-tech sectors punish inefficient capital allocation severely: strategic focus and technology leadership are harder to recover than scale. Consolidation must therefore be asymmetric, driven by industrial rationale rather than predefined structural outcomes, and selective: some companies

[12] EIC Accelerator results for the 1 October 2025 cut-off, published February 2026; EuroHPC Joint Undertaking tender notices, 2025 to 2026; HORIZON-CL4-2026-04-DIGITAL-EMERGING-11, -12 and -18; Council Regulation (EU) 2026/150 of 16 January 2026. The EIC does not publish time from selection to disbursement.

[13] European Commission, Fifth Annual Report on the screening of foreign direct investments into the Union, 14 October 2025. The review total is inflated by Sweden's first full year of operation.

should be acquired, some should partner, and some should be allowed to fail.

Formal consolidation is not the only route to the industrial result. Strategic partnerships, supply-chain integration and collaborative development can deliver much of the same capability while preserving flexibility and competitive independence, and several of the most significant recent alignments in Europe's enabling-hardware layer have taken exactly that form. Policy should be indifferent between the routes.

2.8 The fabrication problem

A European quantum company that needs to manufacture at industrial scale cannot get access to a line. Capacity exists, and the terms on which a company can use it do not.

Meeting the size, weight, power and cost targets that decide whether quantum systems leave the laboratory requires fabrication, packaging and test capacity no single company can justify building alone. Customers will fund non-recurring engineering but generally demand exclusivity in exchange, and research and technology organisations hold publicly funded pilot lines but rarely cede the operational control that qualified commercial production requires.

Research and technology organisations also own the process intellectual property their pilot lines generate, and most have no intention of becoming foundries. The intellectual property accumulates in institutions that will not industrialise it, and no company will build a fab whose core process depends on IP owned by a third party and licensed on terms that can change.

A company whose process depends on intellectual property held by a research organisation does not own its own foundations, and an acquirer of that company would not acquire them either. What would change this is not more facilities but different terms of ownership and access: industrial control over agreed capacity within publicly funded pilot lines, and transfer or co-ownership of process intellectual property where public money paid for it.

[14] Section 35(1a) GWB (Germany) and Section 9(4) KartG (Austria); joint Bundeskartellamt and Bundeswettbewerbsbehörde guidance on transaction value thresholds, updated 23 December 2021. Oberlandesgericht Düsseldorf, decisions of February 2025. A draft twelfth GWB amendment would move the German threshold into Section 35(1).

3. The Recommendations

The five recommendations below are presented in order of consequence rather than in the order the problems were stated, because the ordering is itself the argument: demand and market depth determine whether the others have anything to work with.

Recommendation	What it answers	Stated at
3.1 Make the state the first customer	Public buyers that commit at too small a scale and too slowly to put a revenue floor under a company	2.1
3.2 Deepen the capital base, and change how public money is governed	Shallow markets that price European companies poorly; public money that follows a private lead rather than leading a round; and the governance that makes public vehicles slow	2.2, 2.4
3.3 Debt against contracted revenue	Companies with contracted public revenue but neither listed equity nor cash to borrow against	2.3
3.4 Reciprocity in purchasing and investment	Screening applied to inbound investment while transactions inside the single market meet twenty-seven separate regimes	2.5, 2.6
3.5 Monitor the market	No view of how ownership in the sector is shifting, and no basis for judging whether to act	2.6
Not addressed here	Fabrication, pilot lines and process intellectual property, which belong to the Chips Act; and combination itself, which follows commercial standing rather than producing it	2.7, 2.8

The Quantum Act is where this belongs, and the groundwork can start now. The Act is the right instrument to anchor eligibility criteria, procurement design and the capability programme for the long term, and the roadmap targets agreement between the co-legislators in the third quarter of 2027. In the meantime the work can be prepared with what already exists: procurement under current budgets and procurement law, eligibility criteria published by the bodies that administer the instruments today, the capital-markets agenda through the Savings and Investments Union, and debt instruments already used in this sector. Screening harmonisation runs on its own legislative track. By the time the Act is negotiated, the co-legislators would have awards made, suppliers selected and a design tested against real transactions, and the Act can then give permanence to what is working. Fabrication and pilot-line access are not here at all. They belong with the semiconductor work, where the Chips Act proposal is before Parliament and Council on a shorter clock. Quantum needs that capacity on the same timescale and with the same urgency as semiconductors do, and the file that carries it should treat it as part of the same problem. QuIC has set out separately what that file would need to contain for industrial-scale quantum manufacturing.[15]

3.1 Make the state the first customer

3.1.1 Why procurement comes first

Procurement is not a subsidy. A government that buys a quantum system receives the system: the capability enters public service and the money buys something the buyer needed. What the supplier receives alongside the payment is a revenue line and a reference customer, and those are what change its standing with private investors and lenders. A grant gives a company money and gives a lender nothing to price. The same euro spent as procurement delivers a

[15] Court of Justice, Illumina and Grail v Commission, judgment of 3 September 2024. Case M.11766 NVIDIA/RUN:AI: Italian call-in and Article 22(1) referral accepted 31 October 2024, notified 15 November 2024, cleared unconditionally 20 December 2024.

public asset and unlocks private capital at the same time.

Europe already buys quantum systems. EuroHPC has procured six quantum computers from European suppliers, France commits €500 million through PROQCIMA, and Finland operates two machines it co-created. What follows is not a request for a new category of public spending. It is a request that the buying which already happens should be larger, coordinated above the national level, and designed so that the revenue it produces tells an investor something true about the company that earned it.

European institutions and Member State governments should become first-instance buyers of European quantum products and hybrid classical-quantum systems. The buyers are: public computing centres, defence and security agencies, public administrations, publicly-owned utilities and infrastructure operators. The causal chain is what makes the strategy self-sustaining:

Pre-commercial procurement is demand only if it ends in a purchase. Pre-commercial procurement buys research and development services; public procurement of innovative solutions buys the resulting product. The two are commonly named together, and only the second places an order. Run on its own, pre-commercial procurement buys nothing: commercialisation sits outside the process and it functions as staged competitive research and development funding. Run as the early stages of one process that ends in a purchase commitment, it becomes demand, and the staging is what makes it possible to buy at low readiness. The German Commission of Experts describes the same mechanism when it recommends anchor customer contracts preceded by a competitive process in which suppliers develop products in several stages. The causal chain in this paper runs through procurement that ends in an order, whether or not the earlier stages are called pre-commercial.[16]

Procurement → revenues → defensible valuations → access to capital and debt → industrial capacity, including the capacity to acquire.

The United States runs this systematically. Federal and defence procurement is the revenue floor under every American deep-tech champion; the DARPA Quantum Benchmarking Initiative provides the sectoral template; and the June 2026 Executive Orders extend the model further, including provisions for advance market commitments. The sums involved are not comparable to those Europe currently contemplates: the Commerce Letters of Intent of 21 May 2026 committed $2,013 million across nine companies, and DARPA's Quantum Benchmarking Initiative made Stage C awards of $31.8 million in September 2025 and $125 million in July 2026 to a single company, with only two companies reaching that stage.[17]

Procurement is not downstream of scale. It is an input to it, and it can start now, before any transaction closes.

3.1.2 How to design it

Design the procurement so the resulting revenue carries information. Competitive, multi-vendor awards against published performance benchmarks, with staged down-selection, produce revenue that evidences capability against international comparison. Directly allocated national orders produce revenue that evidences a relationship. Both appear identically on an income statement, and private investors and lenders will read both as signals of commercial standing, so the Union has a direct interest in the signal being reliable. Section 3.6 sets out what that revenue does and does not tell a selector.

The evidence for competitive award design is causal rather than assumed. Sabrina Howell studied United States Department of Energy small-business awards made between 1995 and 2013, comparing firms that scored just above the funding cut-off with those just below. Early-stage grants produced large increases in later venture investment, revenue, survival and successful exit, with the largest effects for young firms in high-spillover sectors. Larger later-stage awards under the same programme showed no measurable effect.[18]

Work on the European SME Instrument points the same way. That programme ran from 2014 to 2020, spent €3,000 million and selected by ranking. It produced increases of roughly 30% in citation-weighted patent filings, with higher intangible investment, employment and revenue

[16] European Commission, draft revised Merger Guidelines, published 30 April 2026; consultation closed 26 June 2026.

[17] Commission Work Programme 2026; Joint Roadmap agreed between Parliament, Council and Commission, April 2026.

[18] Charles Edquist and Jon Mikel Zabala-Iturriagagoitia, "Pre-commercial procurement: a demand or supply policy instrument in relation to innovation?", R&D Management 45(2), 2015, 147–160.

growth, a lower probability of failure and more follow-on private financing, again strongest for younger and smaller firms.[19]

The two programmes have different phase structures and should not be read as a single result. What they share is that small, early, competitively awarded support works, and that large later-stage support is harder to evidence. That is the case for staged milestone-based selection against published criteria rather than for designation.

Each pillar needs demand, and each needs it in a different form. Computing and simulation will attract the first and largest procurement, because hybrid classical-quantum workloads are where industrial users first meet the technology and where hybridisation capability is built. That is not a reason to route everything through it, and it is not where the demand argument is strongest.

Sensing and metrology has the shortest route from procurement to deployed capability of any pillar. The products exist, the buyers exist, and they are overwhelmingly public: water quality and network monitoring, energy grid measurement, medical imaging and diagnostics, geophysical and infrastructure survey, navigation in denied environments, and defence applications across all of these. Competitive, benchmarked procurement in sensing would produce revenue, references and industrial scale faster than in any other part of the sector, and the public bodies that would do the buying are not the ones that buy computing.

Communications and security has an infrastructure programme and a transition to fund. EuroQCI is a procurement channel that already exists, and the migration of public systems to post-quantum cryptography is a demand event of known scale and known deadline. Treating that migration as a security compliance exercise rather than as an industrial opportunity would hand a European market to suppliers outside Europe.

Enabling technologies is bought by every other pillar and by every quantum programme worldwide. It needs demand of a different shape, qualification, pilot-line access and capacity commitments rather than product purchases, which is the subject of the passage on pilot lines below. A demand programme concentrated on computing alone would fund one pillar of four, and would leave the segment in which Europe genuinely leads dependent on demand created for someone else's system.

IP stays with the supplier. Procurement-linked instruments should allow companies to retain full ownership of their intellectual property and to exploit it commercially, with procurers retaining the usage rights they need. This is established QuIC policy and it is not incidental to the argument: procurement that transfers IP to the public purchaser builds a public asset, whereas procurement that leaves IP with the company builds a company, and it is the second that produces the balance sheets, valuations and acquisition capacity this paper is concerned with. Procedures for small-value contracts should be simplified in recognition that smaller suppliers do not have the administrative capacity to absorb onerous processes.

Conditions are what make demand build an industry. Germany created demand for solar photovoltaics through the feed-in tariff of 2000 and the demand arrived, taking roughly half the world's new installations between 2004 and 2010. The tariff paid a price to whoever supplied, so it subsidised consumption of modules rather than selecting their producers, and the manufacturing moved to whoever could produce most cheaply. German production-equipment suppliers sold their lines to those manufacturers and prospered; the module makers did not. Europe's strongest commercial position today is in that same equipment layer. Public procurement differs from a tariff in the respect that matters here, because a procuring authority chooses its supplier and can attach conditions to the award, which is why the design points above are not optional detail.[20]

This paper takes no position on which body should run the procurement. QuIC has argued separately, in its response to the consultation on a Single Basic Act for Joint Undertakings, for a dedicated EuroQuantum Joint Undertaking with the autonomy to use procurement-linked instruments. The argument here holds whichever body carries it.

3.1.3 What it costs, and whether Europe can run it

Scale. The commitment has to be material to a company's accounts, not to a programme's budget line. The path set out in the costed

[19] DARPA Quantum Benchmarking Initiative, Stage C awards 2025 and 2026; Executive Orders 14412 and 14413, 22 June 2026.

[20] Sabrina T. Howell, "Financing Innovation: Evidence from R&D Grants", American Economic Review 107(4), 2017.

roadmap (§4) is €300–500 million in first-wave commitments within six months, €1,300–2,000 million across the first eighteen, and €2,800–4,500 million across the first three years. The reference points are external: the Commerce Letters of Intent of 21 May 2026 committed $2,013 million across nine companies, with government equity attached, and single commitments within it run to $1,000 million for IBM and $375 million for GlobalFoundries.[21] Procurement at pilot scale produces pilot-scale effects. These are orders of magnitude rather than a budget. What matters is the scale at which procurement begins to change company economics, not the precision of any single figure. One caveat on that comparison: United States federal quantum research funding runs at roughly $1,000 million a year, which is close to European headline figures. That is research budget rather than procurement, and no clean public figure separates United States federal procurement of quantum systems from research funding. The difference that matters here is the size and speed of individual commitments, not the aggregate.

Europe has not yet procured innovation at anything like this scale. The Commission's innovation procurement benchmarking, published in May 2026 across thirty countries, finds total European innovation procurement investment still at about half the level of other leading economies.[22] The Commission's evaluation of the 2014 Public Procurement Directives, published in October 2025, finds innovative procurement progressing unevenly, concludes that the directives did not improve legal clarity or flexibility, notes that average bids per tender have declined, and announces a revision.[23] Independent review of pre-commercial procurement finds its effectiveness still unevidenced against traditional procurement, and identifies the shortage of commercially and technically qualified procurement staff as a structural constraint.[24] The honest position is that European innovation procurement has not been evaluated well enough to call it a failure, is used at roughly half the scale of comparable economies, and rests on an instrument that does not create demand. That is a design problem, and procurement capacity has to be built alongside the programme rather than assumed.

The legal basis for preference. European preference in public purchasing must be pursued through routes that are legally robust: security and defence exemptions, PCP (which falls outside the Public Procurement Directive as exempted R&D services and is therefore both faster and more flexible at this technology maturity), sovereignty and supply-chain-resilience criteria in award decisions, and the economic-security provisions under discussion in the Commission's wider procurement reform. A general preference asserted without regard to the Union's procurement and international trade obligations would not survive challenge. A preference exercised in purchasing is not the same as a restriction on investment, and the distinction is developed under reciprocity (§3.4): Europe can prefer European suppliers when it buys while remaining open to foreign capital when it is invested in.

Independent corroboration. Two national bodies reached the same conclusion independently in 2026. Germany's Commission of Experts for Research and Innovation recommended that the Federal Government conclude anchor customer contracts with quantum companies: specified but technology-neutral, with clear termination criteria, and preceded by a competitive process in which suppliers develop new products in several stages in competition. The French Cour des comptes recommended greater use of public procurement on the PROQCIMA model, and identified the difficulty of raising private European capital as the principal weakness of an otherwise well-run national strategy.[25]

[21] Pietro Santoleri, Andrea Mina and co-authors on the EU SME Instrument, Horizon 2020, 2014 to 2020. The phase structures of the two programmes differ and the Phase II findings are not comparable.

[22] Erneuerbare-Energien-Gesetz, 2000. Germany took roughly half of the world's new photovoltaic installations between 2004 and 2010 and sector employment reached about 150,000 by 2011, falling to just over 45,000 by 2016; Q-Cells, Solon and Conergy failed and SolarWorld filed for insolvency in 2017. In recent years around 2% of photovoltaic modules installed in the European Union were manufactured in the Union.

[23] United States Department of Commerce, announcement of 21 May 2026: nine letters of intent totalling $2,013 million under the CHIPS and Science Act, comprising two quantum foundries (IBM $1,000 million, GlobalFoundries $375 million) and seven quantum computing companies, with a minority non-controlling equity stake in each as a condition of the award.

[24] European Commission, EU Innovation Procurement Observatory benchmarking, 13 May 2026.

[25] European Commission, evaluation of the 2014 Public Procurement Directives, 14 October 2025.

3.2 Deepen the capital base, and change how public money is governed

The reason a European acquirer cannot pay in stock is not a defect of European corporate law or of any individual company. European public equity markets are shallower, less liquid and less well covered than US markets, so European private paper has neither a price nor a visible route to one. No transaction-level instrument repairs this; only market depth does. A financial architecture that engineers around the problem, deal by deal, will always be more complex and less reliable than one that reduces it.

Four measures would deepen the capital available to the sector, and none of them is quantum-specific.

The Savings and Investments Union is the first-order remedy. It is the single intervention that raises the acquisition capacity of every European technology company at once, without selecting any of them, and it is the one measure in this paper that the sector cannot substitute for by its own efforts. The Quantum Act should be explicitly linked to it.

Institutional capital does not currently reach the sector. Alternative Investment Fund Managers are largely absent from European quantum financing, and European Long-Term Investment Funds, following the ELTIF 2.0 reform, are a suitable vehicle for late-stage deep-tech exposure at the scale European quantum companies now require. The Commission should establish what prevents these channels from reaching the sector. The answer is likely to combine ticket size, diligence capability and eligibility interpretation, all of which are addressable.

Corporate venture capital is a pool that exists and is underused. Several large European industrial and technology groups run venture arms that already invest in quantum, and they bring capital that is patient by construction alongside industrial knowledge, supply-chain access and a potential route to acquisition that purely financial investors cannot offer. Matched public participation, or eligibility treatment that recognises corporate strategic investors as qualifying private capital, would mobilise it. This requires no new money from the Union, which makes it the most promising place to start.

Scale-up and industrial expansion capital is a separate need. Growth equity and capital expenditure financing for the transition from first products to industrial-scale manufacturing is a different requirement from either venture capital or acquisition finance, and Europe's enabling-hardware companies are making that transition now.

Governance decides tempo. The speed of a public investment vehicle is a function of how it is governed rather than of public ownership. A fund that keeps transaction-level sign-off with government will always be too slow. The Scaleup Europe Fund is built the other way: the Commission anchors it and sets the sectors, a privately owned manager selected in competition runs the investments, and decisions are not referred back. It is also the only European public vehicle able to lead a round rather than follow one, which is why that structure should be the template for public participation in this sector rather than the exception. The wider problem of how long public instruments take is set out at §2.4, where it is a constraint rather than an ask, because there is no single addressee for it.

3.3 Debt against contracted revenue

The European Investment Bank is well regarded by the sector and already equipped: a venture debt product explicitly covering quantum computing, photonics and advanced hardware; a first quantum venture debt operation of €35 million in 2022[26]; a Quantum Finance Lab since 2023[27]; and a demonstrated syndicated model in adjacent deep tech.[28]

Two corrections to the conventional formulation matter for the Act's design.

Venture debt is typically tranched, with only later tranches conditioned on revenue

[28] European Investment Bank press release, 28 April 2022.

milestones.[29] It is therefore available earlier than a flat "debt requires revenue" rule implies, and the EIB's execution in this product is regarded as capable and professional.

Venture debt finances a revenue ramp; it does not substitute for equity. Applied to a company without a clear commercial trajectory, it transfers risk to the borrower at the worst possible moment. The Act should encourage its use for scaling delivery against demonstrated demand and discourage its presentation as a general financing solution.

Within those limits, three applications are well matched to this sector: **procurement-backed lending** against multi-year public contracts, where contracted public receivables are strong collateral even where they are weak evidence of market validation; **acquisition financing** alongside equity, reducing the equity required per transaction; and **capex facilities** for the enabling-hardware layer, whose industrial assets suit conventional secured lending.

3.4 Reciprocity in purchasing and investment

Defensive instruments should buy time without imposing costs on the companies they protect.

Screening of quantum investment is now settled law, and the argument has moved on. Regulation 2019/452 already listed quantum among critical technologies. Regulation (EU) 2026/1386, adopted by Council on 8 June 2026 and published in the Official Journal on 26 June, repeals and replaces it. It requires every Member State to operate a screening mechanism over a mandatory minimum scope, and that scope names semiconductors, quantum technology and artificial intelligence among advanced technologies, alongside dual-use items, defence-related products, critical raw materials, and critical transport, energy, digital and financial market infrastructure. Research-only activities in the listed technologies fall within it. The regulation applies from 17 January 2028,[30] after an eighteen-month transition. The question is therefore no longer whether quantum should be screened specifically, but how the regime is operated: consistently between Member States, on timetables that do not themselves deter investment, and with a clear distinction between the narrow set of transactions that threaten strategic capability and the great majority that do not.

State explicitly that screening is not rejection. The purpose of screening is visibility and assessment, and the great majority of transactions should clear. Framing it as a presumption against foreign investment damages relations with third countries and deters investors the sector needs.

Reciprocity, not protection. This was the sharpest division in the consultation, and the division tracks position in the value chain. Globally integrated suppliers warn that restricting foreign capital and exits would deter the investors a high startup-formation rate depends on. Companies exposed to sovereign competition argue that Europe needs a European-preference posture to match what other jurisdictions now practise openly. Both are right about their own situation, and the argument is only irreconcilable if "openness" is treated as a single setting applied to everything.

Prefer European suppliers when Europe is buying. Procurement is where sovereignty is actually purchased, every other major jurisdiction already exercises preference in its own public purchasing, and a Europe that declines to do so is not being open: it is unilaterally disarming in the one area where it has complete freedom of action.

Stay open when Europe is being invested in. Foreign capital, international investors and the prospect of a competitive exit are what sustain the formation rate that makes any consolidation strategy worth having. Restricting them would deter investment long before it deterred an acquirer, and would damage the pipeline this paper depends on.

[29] EIB Advisory, Quantum Finance Lab, October 2023.

[30] European Investment Bank press releases, February 2026.

Govern both by reciprocity. Europe should be as open as its counterparts are, and no more. Reciprocity is the principle that makes the first two consistent rather than contradictory: it justifies preference where others practise it, it justifies openness where others reciprocate, and it supplies a defensible answer to the charge of protectionism, because the standard is set by others' conduct rather than by European preference alone. It also protects something European companies actively need. European acquirers buy outside the Union, and a regime that restricted inbound investment without regard to reciprocity would invite exactly the retaliation that would close those markets to them.

Weigh export controls against their industrial effect. Europe's enabling-hardware companies sell globally, and export restrictions bear on them more heavily than on any other part of the sector. Where controls close a large market, the predictable consequence is not that the technology goes undeveloped but that it is developed locally, behind protection, with state support and access to deep domestic capital markets: after which the subsidised result competes with European suppliers in third markets. Controls on genuinely sensitive capability are legitimate and necessary. Controls that extend further than security requires transfer market share to competitors Europe would rather not create, and the companies bearing that cost are the ones in the segment Europe leads. The industrial effect should be assessed explicitly rather than treated as an acceptable externality of a security decision.

Protect outbound freedom. Any regime must be tested against the acquisition activity of European companies themselves. European enabling-hardware companies acquire abroad and depend on international customers, suppliers, partners and investors. A framework that constrains inbound investment while incidentally complicating European companies' own international transactions would be self-defeating, and the companies most exposed to that risk are precisely the ones Europe is trying to strengthen.

Define fairness in competitive processes. Where public instruments participate in a competitive situation, the rules should be set in advance and should not reduce to "highest bid wins" a default that systematically favours the best-capitalised bidder, which is the asymmetry this paper is addressed to.

A right of first offer for European buyers remains an option worth examining within the Quantum Act, but it requires two things the current proposal lacks: an objective definition of which acquirers qualify, and a window short enough not to deter sellers: no more than fourteen days has been suggested, and that appears to be the right order of magnitude. Without both, it operates as a delay rather than a redirection.

3.5 Monitor the market

Two frictions are worth naming, and neither should hold up a transaction.

Monitor the market rather than reforming merger review. Engaging the merger guidelines review is not the right ask at this stage. The market is not developed, acquisitions are not the binding problem, and EU merger control does not reach transactions at this scale: its thresholds begin at €5,000 million of combined worldwide turnover, against European quantum revenues measured in single-digit millions. What is needed is monitoring of how ownership in the sector evolves, so that the question of whether and how to intervene can be answered when it becomes live. Monitoring should track acquirer identity rather than transaction volume, because the published evidence finds that post-acquisition outcomes depend on who the acquirer is: serial acquirers in dominant positions are associated with declines in acquired-firm innovation, while occasional acquirers are not. The French Cour des comptes recommended the same at national level in July 2026, calling for stronger tracking of financing in the sector, in both destination and origin, and of the companies receiving it. The Commission's draft revised Merger Guidelines of 30 April 2026 remain the vehicle if the question becomes live, and they already propose an innovation shield for acquisitions of small innovative companies.

Of the recommendations in this paper, this is the one that requires no public money.

Employee equity does not port cleanly between Member States, and key staff can be materially disadvantaged by a cross-border merger. The

Commission's EU Inc. proposal[31] addresses this directly through a harmonised EU-wide employee stock option scheme with taxation deferred to sale, and that is its most relevant feature for this sector. Corporate form itself should remain a company's choice; a consolidation should never wait for its legal wrapper.

Taxation, labour law and social security remain national competences and are unlikely to move on the Quantum Act's timescale. The Act should work within them rather than assume their harmonisation.

3.6 Choosing who to support

Each of the five recommendations above has to select between applicants: who receives a staged procurement award, who the fund invests in, who the bank lends to. Revenue is the criterion most often proposed for that, and it is the right test for some of those decisions and the wrong one for others.

Revenue has the appearance of objectivity, being measurable and auditable in a way that judgements about technical maturity are not, which is why an instrument will default to it unless a better criterion is specified. And the consequences of getting it wrong compound: eligibility determines who is capitalised, capitalisation determines who can acquire, and acquisition determines the industrial structure that results. Revenue answers two distinct questions, and they should be kept apart.

Revenue does not determine who should be supported.

Timing. Revenue arrives at different moments in different segments for reasons unrelated to prospects. Enabling hardware sells to every platform maker worldwide and has revenue today; a platform company several years from a commercially useful machine may have the stronger long-run position. A criterion that ranks them by current revenue ranks them by segment, not by merit.

Quality. Not all revenue carries the same information. A supplier may show higher revenue than its peers chiefly because of national orders, while being less technically mature and less commercially promising than a competitor with less. What distinguishes informative revenue is not whether the buyer is public or private but whether the award was contested. European public procurement publishes its criteria in advance and justifies awards against them, which can make it more transparent than a privately negotiated contract awarded without competition. A criterion that assumes public revenue is administrative and private revenue is earned will misread both.

Causality. The relationship between revenue and acquisition capacity runs in both directions. The most active acquirer in the sector raised capital at valuations that substantially preceded its revenue, and is now acquiring revenue in part to justify them. Capital access produced the revenue as much as the reverse. Treating current revenue as the independent variable inverts a relationship that is, in practice, circular.

Allocation. There is a stronger version of the same point, and it does not depend on any of the three above. If revenue were the test, the pillars would rank close to the reverse of how capital is actually allocated. Sensing and metrology has products and public buyers now. Enabling technologies is profitable and sells worldwide. Communications and security has an infrastructure programme and a funded transition. Computing has the longest path to revenue of the four, and takes the large majority of private capital: of roughly $12.6 billion invested in quantum start-ups worldwide in 2025, on one published estimate about 90% went to computing, with sensing and

[31] European Investment Bank venture debt product criteria, eib.org.

communications sharing the remainder.[32] So either the market is systematically mispricing the sector, or revenue is not the test that investors themselves apply. On either reading it cannot be the primary criterion for public support.

There is a further consideration specific to Europe's situation. If public procurement becomes the principal instrument of demand, as this paper recommends (§3.1), then public purchasing will itself generate a growing share of the sector's revenue. A selection criterion based on revenue would then be measuring, with a lag, the Union's own earlier purchasing decisions. The criterion would appear objective while in fact recording an administrative choice made upstream, where it is less visible and less accountable. This is a strong reason to keep the two separate.

The practical conclusion. Where criteria are needed for access to public instruments, they should be plural and published. Revenue belongs among them, weighted for quality, and weighted for the capital intensity of the layer in which it is earned. A flat revenue ranking systematically favours layers that can book revenue without building a quantum computer over layers that book it only after several years of capital expenditure, which means it would rank a software company above a QPU company for reasons that have nothing to do with either one's prospects or strategic value. Revenue should therefore sit alongside, not above: technical maturity and verifiable technical milestones; customer traction and international market access; execution capability and the financial and technical capacity to acquire and integrate technology; sovereign substitutability: how readily the capability could be sourced elsewhere if it were lost; European fabrication and intellectual-property footprint; and participation in national defence and security programmes. And eligibility criteria should be exactly that, thresholds that any company meeting them can rely on, rather than an instrument for selecting a small number of companies in advance.

These criteria are not pillar-neutral, and the weighting should reflect that. Sovereign substitutability bears hardest on enabling technologies, where a supplier lost to a foreign acquirer cannot readily be reproduced and every other pillar depends on it. Participation in national defence and security programmes is most relevant to sensing and metrology and to communications and security, where public buyers already exist. Weighting for capital intensity matters most within computing, where the spread between a software company and a platform company is widest. European fabrication and intellectual property footprint cuts across all four. A single set of weights applied uniformly would favour whichever pillar happens to match them, which is the failure the criteria are meant to avoid.

There is a further argument against selecting early, and it is the strongest one. In a sector whose technology roadmaps remain unsettled, the company that eventually leads a layer may not yet exist. Adjacent technology fields supply the pattern: companies founded years after an apparent leader, often by people who left it, have repeatedly become serious competitors within a few years. A designation made at the outset of such a race entrenches the wrong company and disadvantages the entrant precisely when its capital constraints bind hardest. Published thresholds, open continuously, admit the entrant that designation would have excluded, which is not a concession to fairness but a hedge against being wrong about who wins.

[32] Regulation (EU) 2026/1386, adopted 8 June 2026, replacing Regulation (EU) 2019/452.

4. A Costed Roadmap

The roadmap sequences the five recommendations. Demand comes first and is phased, because the others depend on revenue existing: §3.1 supplies it and §3.3 lends against it. The capital-markets work at §3.2 runs in parallel on its own legislative clock rather than in phases. Reciprocity and market monitoring, §3.4 and §3.5, are continuing obligations that start immediately and do not end.

It starts now, not with the Act. Phase 0 is dated from the moment the criteria and procurement design are settled, which is a matter of months, rather than from the Quantum Act. The Act has not been proposed and its content will be negotiated between the co-legislators through 2027. Starting now means the co-legislators negotiate with results in front of them: awards made, suppliers selected, early deliveries. Waiting means they negotiate in the abstract. The proposal has already slipped once, which lengthens the interval before anything is legislated and makes starting under existing instruments more urgent, not less.

Indicative costs are order-of-magnitude envelopes for the public-private effort as a whole, comprising public instruments plus catalysed private co-investment. They are not requests for money beyond the budget already proposed: essentially all of it maps onto instruments that already exist, and the ask is for a share of the Digital Leadership window rather than for an addition to it.

The weighting is the argument. Almost the whole envelope is procurement, which buys the industrial capability it needs through competitive award, and the remainder is debt secured against contracted public revenue rather than against projected revenue. No part of it is equity. A programme weighted the other way, the majority in equity for a small number of selected companies, would spend more to achieve less, because it would be financing transactions in a market that does not yet generate the revenue to sustain them.

Two design rules apply throughout.

Concentration by competition. QuIC has supported concentrating resources on a limited number of strong European players, at a scale of at least €3,000 million annually for strategic industrial capability[33]. This roadmap retains that ambition and changes the mechanism: resources concentrate on companies that win strict, milestone-based competitions with staged down-selection, not on companies designated in advance. The competition stays open to entrants, which is what protects the pipeline from which future leaders emerge.

Demand first. Procurement is an input to industrial capacity, not a reward for achieving it. It requires no transaction to have occurred and can start immediately.

4.1 Phase 0: Establish demand and criteria (months 0–6)

- First competitive, multi-vendor procurement calls against published performance benchmarks, using pre-commercial procurement where technology maturity suits it. Contracts leave IP with suppliers, with procurers retaining the usage rights they need. Simplified procedures for small-value contracts.
- Demand channels opened across the full stack (computing and simulation, communication and security, sensing and metrology, and the enabling-technology layer) rather than concentrated on one pillar.
- Publication of objective, plural eligibility criteria for scale-up instruments: technical maturity, customer traction, international market access, execution capability, and financial and technical capacity to acquire and integrate technology.
- Design of milestone-based competitive programmes with staged down-selection and fairness rules that do not reduce to highest bid wins.
- Standing eligibility and once-only ownership and control assessment.
- Capital-markets workstream initiated: what prevents AIFM and ELTIF capital from reaching late-stage European deep tech.

Indicative cost: €300–500 million in first-wave procurement commitments, plus €20–40 million for programme design, criteria

[33] European Commission, proposal for a Regulation on a 28th regime corporate legal framework, EU Inc., COM(2026) 335.

development, assessment reform and coordination. The procurement figure is set deliberately above the level of a pilot: a first wave materially below this range is comparable to what a single US programme commits to one company, and will not register in any European company's accounts.

4.2 Phase 1: Scale demand; first competitive awards (months 6–18)

- Procurement scales to multi-year framework contracts across public computing centres, defence and security agencies, metrology institutes and Member State administrations.
- First milestone-based competitive awards for strategic industrial capability, with staged down-selection rather than upfront designation.
- Debt lines established against the demand base: procurement-backed lending against contracted public receivables, and capex facilities for enabling-hardware industrial expansion.
- Member State and bilateral funding routes recognised, coordinated and made interoperable with Union-level instruments.
- Harmonised employee equity adopted, using whichever European corporate vehicle is fastest at the time.
- Cross-sectoral screening harmonisation progressed, tested against European companies' own outbound activity.
- First transactions in this window are those the market would support in any case: acquisitions by companies with existing commercial standing, financed with cash and debt, prioritising Ring 1 assets.

Indicative cost: €1,000–1,500 million in further procurement commitments, €1,200–2,000 million in competitive capability awards, €300–600 million in debt facilities.

4.3 Phase 2: Scale follows capability (months 18–36)

- Procurement matures into a bankable base load; public-sector revenue becomes collateral as well as income.
- Companies reaching sufficient scale prepare for market access, which is what converts equity into acquisition currency. Sequencing discipline applies: list from commercial strength, not to acquire it.
- Share-exchange transactions become available as acquirers reach the market. Where public instruments participate in transaction-driven rounds, pre-cleared eligibility from Phase 0 is what makes participation possible at transaction tempo.
- Consolidation proceeds along whichever geometry the commercial situation supports.
- Capital-markets measures mature: broader institutional access to growth-stage deep tech, and progress on the structural agenda that determines what any European listing is worth.

Indicative cost: €1,500–2,500 million in further procurement commitments, €2,000–3,000 million in competitive capability awards, €500–900 million in syndicated and procurement-backed debt.

4.4 Phase 3: Offensive (months 36–60)

- Ring 2 acquisitions using listed or late-stage paper plus operating cash.
- Cross-track integration where commercially justified, building toward full-stack European offerings for sovereign customers.
- European companies bidding for allied-country sovereign programmes, converting industrial capability into global market share.

Indicative cost: procurement at a steady state of €600–900 million per year (€1,200–1,800 million across the phase); competitive capability awards €500–1,000 million of public commitment, increasingly self-funded from company revenues and market currency as programmes mature and moving toward the €3,000 million annual reference on a blended public-private basis; debt €200–500 million, increasingly commercial rather than institution-anchored.

4.5 Summary

Phase	Horizon	Core actions	Procurement	Capability awards	Debt
0: Demand & criteria	0–6 months	First competitive multi-vendor calls across all four pillars; published eligibility criteria; competitive programme design; once-only assessments	€300–500M	€20–40M (design)	
1: Scale & first awards	6–18 months	Multi-year frameworks; first milestone awards; demand-backed debt lines; bilateral routes; employee equity; screening harmonisation	€1,000–1,500M	€1,200–2,000M	€300–600M
2: Capability & consolidation	18–36 months	Bankable procurement base load; market access for companies reaching scale; share exchange becomes available; capital-markets measures mature	€1,500–2,500M	€2,000–3,000M	€500–900M
3: Offensive	36–60 months	Ring 2 acquisitions; full-stack integration; allied sovereign programmes	€1,200–1,800M	€500–1,000M	€200–500M

Phase figures are additions within each phase, not running totals; they sum to the five-year totals below. On the procurement line this implies €1,300–2,000 million committed across the first eighteen months and €2,800–4,500 million across the first three years.

Five-year indicative totals: €7,700–12,300 million in procurement, including the competitively awarded industrial capability it buys, plus €1,000–2,000 million in EIB-anchored and syndicated debt.

These figures should be read against the budget they would come from. The Commission's proposal for the 2028 to 2034 financial framework, COM(2025) 555, creates a European Competitiveness Fund with an envelope of €234,300 million. Within it, the Digital Leadership window[34] is given as €51,500 million in Parliament's procedure file. Article 39 of the draft regulation covers artificial intelligence research and deployment, technological sovereignty, the digital start-up and SME ecosystem, advanced digital infrastructure at scale including high-performance computing, semiconductors, quantum computing and cybersecurity, and advanced cybersecurity capacities. All of these figures are proposals under negotiation: Council agreed a partial position on the Fund on 16 June 2026 with no budget figures fixed, and agreement on the financial framework is targeted for the end of 2026. On the same public-private basis used here, the envelope above is 15.0% of that window at the low end and 23.9% at the high end, over a shorter period. The €3,000 million annual figure QuIC has argued for is €21,000 million across the seven-year framework, or 40.8% of the window.

Those are large shares and the paper does not pretend otherwise. Quantum is the smallest of the three critical technologies in that window by current private investment and the one where Europe's relative position is strongest, so a given euro moves the European share further than it would in artificial intelligence or semiconductors. The enabling-technology layer, where Europe leads globally, supplies every quantum programme worldwide and is therefore an export

position rather than a domestic subsidy. And roughly half the envelope is procurement, which buys capability the public sector needs in any case rather than transferring resources to companies.

The window is contested and the allocation between the three technologies is a political judgement rather than a technical one. What this paper can establish is the scale at which intervention changes company behaviour. Below the first-wave figures set out above, procurement does not register in a company's accounts, and the rest of the programme has nothing to work with.

The strictly new public commitment is a fraction of this: the bulk is concentration, sequencing and redirection of the Scaleup Europe Fund, InvestAI, ETCI, EIC equity, EIB venture debt and lending facilities, European Competitiveness Fund windows, national vehicles and existing procurement budgets, alongside catalysed private capital.

For calibration: the combined low end is comparable to what a single US acquirer deployed, in stock, for one UK company and three bolt-ons, and the procurement line remains below the annual scale of US federal quantum demand. The question before Europe is not whether it can afford this. It is whether it can afford to keep financing fragmentation.

5. Who Acquires, and What the Record Shows

The recommendations and their sequencing are complete. What follows is the evidence behind them. Once the recommendations work, European companies reach commercial standing, and companies with standing buy other companies: transactions follow the scaling rather than producing it. So the evidence that the industry is scaling is then transactions: which European companies can buy another today, on what terms, and what the completed deals show. The record that follows leans toward computing, because that is where transactions are announced: sensing deals are frequently completed between privately held companies, often with defence or security customers, and are not disclosed. The transaction mechanics set out here are also drawn from venture-backed capital structures, and apply to sensing and enabling-technology companies only where they share them.

The potential for combination differs by pillar, so the record has to be read pillar by pillar. Where companies do combine, three geometries recur: horizontal combination joins companies operating at the same layer across every platform, intra-platform combination joins companies built on the same underlying physics, and vertical integration brings an adjacent layer inside the company.

5.1 How combination works, pillar by pillar

5.1.1 Computing and simulation

At the processor level, scale is reached inside a qubit platform rather than across platforms. Combining two processor companies is only viable within a platform: a superconducting company can absorb another superconducting company, but merging superconducting with neutral atoms, trapped ions, photonics or silicon spin combines incompatible fabs, cryogenics, control stacks and physics teams. The boundary is set by physics and process, not by branding: bosonic and cat-qubit approaches are superconducting circuits, the same junctions, the same cryogenics, the same fabrication and control stack, and belong within the superconducting track rather than alongside photonics. Any mapping exercise should classify by the underlying platform, since a taxonomy that separates companies sharing a fab and a control stack will group companies that cannot usefully combine and separate ones that can. Platform consolidation is capital-intensive, slow to integrate, and can only run as parallel intra-platform tracks. Europe has credible activity in each of the principal families, superconducting, neutral atom, trapped ion, photonic and silicon spin, and the last of these has been consistently under-represented in the consolidation debate despite significant European development.

Above the machine sit the hardware-agnostic layers: algorithms, compilers,

[34] McKinsey Quantum Technology Monitor, 2026 edition.

middleware, error mitigation, orchestration, quantum-inspired and quantum-AI methods, and the application libraries customers pay for. It is additive: acquired teams, IP and customer contracts integrate in months, with no platform incompatibility by construction. It is capital-light: the consolidation budget buys teams and customers, not cleanrooms. And it is where durable value has accrued in every computing paradigm of the last four decades: the recurring margins settled in the layers that serve all machines, not in any single machine. One form of that value capture is specific to this pillar and worth naming: the capability to orchestrate quantum and classical resources against a real workload is itself a source of software differentiation, and a plausible axis of industrial concentration rather than merely a product feature.

Vertical integration is the fourth logic, and it is the one currently most active in Europe. A platform company acquires an algorithmic or software capability tuned to its own hardware, in order to reach useful performance sooner than a general-purpose stack allows; or it acquires elements of the control electronics or cryogenic layer on which its performance depends. This crosses the layer boundaries that horizontal and intra-platform consolidation treat as fixed, and it is a legitimate industrial strategy rather than a departure from good practice: where quantum advantage depends on the co-design of algorithm and machine, the argument for owning both is strong. A framework that recognised only horizontal consolidation would classify Europe's most recent quantum acquisitions as anomalies.

Vertical integration runs further down the stack than software, and the most consequential case is manufacturing. In July 2026 IonQ completed the acquisition of SkyWater Technology, the largest exclusively US-based semiconductor foundry, in a cash-and-stock transaction valued at approximately $1.8 billion, and described the result as the first vertically integrated full-stack quantum platform company.[35] Whatever one concludes about that specific transaction, the direction is instructive: as quantum processors move from laboratory devices toward manufactured products, control of fabrication, packaging, test and qualification becomes a competitive variable rather than a procurement detail. Europe's position here is unusually strong and unusually underused: the Union has world-class semiconductor manufacturing, and the connection between it and quantum industrialisation is currently made through the Chips Act rather than through any quantum instrument. A consolidation strategy that treats fabrication as someone else's concern is planning for prototypes.

5.1.2 Sensing and metrology

Scale here is built on applications and qualification rather than on platforms. The scarce assets are certified performance in a regulated environment, an installed base with a demanding customer, and the systems integration that turns an instrument into a product. An acquisition in this pillar buys market access, a qualification file and a route to a procurement framework; it rarely buys physics. That makes the logic closer to industrial instrumentation than to computing, and it means the relevant scale is measured in qualified installations rather than in qubits.

This is also the pillar closest to commercial deployment, which cuts two ways. Products exist and buyers exist, most of them public, so revenue is available on a shorter horizon than anywhere else in the sector. But the companies are correspondingly smaller and closer to product, which makes them acquirable at prices that attract no attention: a sensing company can leave Europe without the transaction being noticed.

The transaction record in this pillar is thinner than the activity. Transactions here are frequently completed between privately held companies without announcement, and databases that key on disclosed deal value do not see them. European sensing has in fact consolidated: iXblue acquired the cold-atom instrumentation company Muquans in 2021, iXblue merged with ECA in 2022 to form Exail, and Exail acquired the laser supplier Leukos in 2025, extending the group into the enabling layer. That is application-led consolidation, completed, and largely invisible in the sources normally consulted. Any map of this sector reports what its sources can see, and in this pillar they see least.

5.1.3 Communication and security

Scale here is built on networks and standards: a deployed infrastructure and a certified cryptographic stack, and the gating factor is

[35] QuIC Response to the Call for Evidence on the EU Quantum Act, December 2025, Pillar 2.

certification rather than performance, which favours companies able to carry the cost and duration of a certification programme. Two distinct markets sit inside this pillar and they consolidate differently. Quantum key distribution and quantum-networking hardware follow an infrastructure logic, with EuroQCI as an existing procurement channel. The migration of public systems to post-quantum cryptography is largely a software and integration market, with a known scale and a known deadline, and it is closer to a conventional enterprise technology transition than to anything else in quantum.

This pillar also holds the clearest European loss to date. The most consequential European quantum asset acquired by a foreign buyer in recent years was a communications company rather than a processor company, in a debate conducted almost entirely about computing.

5.1.4 Enabling technologies

This pillar is different in kind from the other three. It is a pillar in its own right, and it is also the layer that every other pillar buys from, which is why it combines horizontally and why it carries both the strongest European position and the sharpest concentration risk.

Between the component level and the quantum computer sits an intermediate hardware layer that every platform buys: cryogenic systems, control electronics, cryogenic I/O and wiring, lasers and laser systems, photonic components, single-photon detectors, cryo-CMOS. Because this layer serves all platforms, it consolidates horizontally, like software, and it is the segment of quantum hardware where Europe already leads the world with commercial revenues and international customer bases.[36]

This layer also carries a risk the others do not. Consolidating cryogenics, control electronics and cryogenic I/O around a single champion would create one European supplier facing every European QPU maker. The same horizontal reach that makes the layer attractive to consolidate makes a consolidated supplier a potential chokepoint for the platform companies that depend on it: companies that are themselves the intended beneficiaries of the strategy. Where public support is directed at consolidation in this layer, it should carry commitments on non-discriminatory supply, interoperability and continued support for open interfaces, so that a champion assembled to serve European QPU makers cannot become a constraint on them. This costs the champion little and removes a legitimate reason for the rest of the ecosystem to oppose the track.

There is a defensive dimension to the same layer, and it is the more urgent one. Enabling-hardware companies are attractive acquisition targets for foreign scale-ups precisely because they are commercially healthy: they generate continuous revenue and operating profit from a global customer base, which makes them easier to value and to finance than a pre-revenue platform company. They are also strategic, since whoever owns them supplies every competitor. The pattern to watch is that exclusivity arrangements need not be part of the transaction: they can be introduced afterwards, once ownership is settled and the acquired supplier's customers have no alternative. By the time the effect is visible in the market, the transaction is long closed. This argues for treating the enabling layer as an early-warning priority rather than a later phase of the strategy.

The strategic conclusion is that Europe should not privilege one pillar or one geometry. Horizontal consolidation in enabling technologies and in software, disciplined intra-platform consolidation at the processor level, vertical integration where co-design justifies it, and application-led consolidation in sensing are all rational responses to different commercial situations. Policy should be indifferent between them and concerned only with the industrial result.

The practical consequence for policy is that a single template will not fit the sector. What is common across the four pillars is the demand and capital conditions described in the two sections that follow. What differs is the industrial logic of each transaction, and a framework that assumed the computing case throughout would misread three pillars out of four.

[36] European Commission, COM(2025) 555, proposal for the 2028 to 2034 multiannual financial framework; European Parliament procedure file for the Digital Leadership window.

5.2 Who can acquire, and on what terms

Revenue largely determines who can acquire. The investors of an acquired company, asked to accept shares instead of cash, are being asked to underwrite the acquirer's future; paper issued by a company with substantial and growing commercial revenue is investable in a way that pre-revenue paper is not. Revenue supports defensible valuations, reduces dependence on grant cycles, attracts the private co-investment that public instruments require, and, subject to the qualifications on debt set out later (§3.3), unlocks it. This is transaction mechanics, and it does not require anyone's endorsement to operate. The market applies this test continuously and without assistance.

Three kinds of European company acquire in this sector, and each faces a different obstacle to doing more of it. The distinction matters for the design of remedies: an instrument that removes one of those obstacles will do nothing about the other two.

Quantum scale-ups have the strongest strategic motive and the weakest means of payment. In the United States consolidation is executed by the quantum scale-ups rather than by the hyperscalers, using listed equity and commercial momentum as their tools; Europe follows the same pattern at smaller scale and without listed currency. Most of the financing remedies proposed in this paper are addressed to their situation.

Established deep-tech companies with acquisition programmes have the means and apply strict conditions to using them. European industrial technology companies with established revenues and functioning corporate development teams have executed quantum-relevant acquisitions: Rohde & Schwarz acquired Zurich Instruments in 2021; Bluefors acquired Cryomech in the United States in 2023 under CFIUS approval; TOPTICA acquired ALS in France in 2023.[37] Others in photonics and precision instrumentation run continuous acquisition programmes into adjacent technologies. What distinguishes this group is not appetite but discipline. It requires demonstrated revenue and demonstrated profitability at the target, and a valuation anchored to financial performance rather than to a funding round. It prefers direct payment in cash or shares, and treats additional structural complexity as a cost that lowers the probability of closing.

The first is that several of the most active acquirers are privately held, Rohde & Schwarz, Bluefors and TOPTICA among them, and none of them needed listed equity to transact. They paid from profitable operations, which is a corrective to any strategy built primarily around manufacturing acquisition currency: what qualifies a European acquirer today is commercial standing rather than access to a structured transaction.

Where that standing came from does not generalise. These are enabling-technology and instrumentation businesses selling into a global commercial market, not companies built on European public demand. The second feature follows from it: acquirers of this kind are unlikely to participate in transactions justified primarily by strategic considerations, and will say so plainly. What would bring them in is not a public financing structure but targets whose economics have improved. For the pillars that have no comparable commercial market to sell into yet, and for platform companies in particular, public demand is the available substitute rather than an ideological preference. That is the argument for public procurement as the demand engine (§3.1).

Large industrial corporates are the most varied of the three, and the category most often misread. Many, outside the deep-tech instrumentation sector, engage with quantum principally as prospective customers: exploratory activity rather than a product roadmap, and no capitalised acquisition vehicle with quantum competence. That is a rational position for a company assessing whether a technology will affect its business in five years, and its most valuable contribution is as an anchor customer under long-term agreements, or at most as a minority strategic investor. This group as a whole will not underwrite a pre-profit sector, and a strategy that assumes it will has no funding behind it.

But several of them are not prospective anything. They already supply key components into the quantum market and sit inside its supply chain today. Semiconductor and precision-manufacturing corporates hold assets the sector needs and cannot easily reproduce: fabrication capability and process control at scale, packaging, test, qualified supply chains, and the industrial engineering discipline required to

[37] IonQ press release, 31 July 2026, completion of the acquisition of SkyWater Technology (NASDAQ: SKYT).

move a working prototype to a manufactured product. At least one major European corporation capable of enabling industrial-scale production in quantum has asked whether large-scale industry needs to take more responsibility for building and operating competitive machines than a startup-centred strategy implies, and considers practical contributions. Where a corporate of that kind is willing to commit capability and capital rather than only demand, it is a consolidator, and a framework that has pre-assigned it the role of customer will not notice.

The categories explain why the obstacles differ, and therefore why no single instrument reaches all three. They do not predict which individual company will act. Within each group, a few companies have the commercial standing and the willingness to commit capital and capability, and most do not. So the categories are a guide to designing instruments, not a basis for allocating them: eligibility for public support should be defined by what a company can and will contribute, not by the type of company it is. That is the argument developed under eligibility and capacity (§3.2). The objective throughout is companies at competitive scale, not a smaller number of them.

5.3 The map: European strengths and transactions already executed

Concentrating support on a limited number of strong companies is right, and selecting them in advance is a different matter. Designation substitutes administrative judgement for market judgement in a sector whose technology roadmaps remain uncertain, it is vulnerable to geographic capture, and it concentrates attention on a small group at the expense of the pipeline from which the next generation emerges. This paper therefore sets out criteria rather than names.

What can be mapped objectively is where Europe is industrially strong, and what has actually happened. The record is more encouraging than the funding statistics suggest.

Pillar	European position	Transactions already executed
Enabling technologies (§5.1.4): cryogenics, control, I/O, lasers and laser systems, photonic components	Global leadership with commercial revenues and international customer bases	Outbound: Bluefors–Cryomech (US, 2023, CFIUS-approved). Intra-European: Rohde & Schwarz–Zurich Instruments (2021). Inbound loss: Oxford Instruments NanoScience division to Quantum Design (US), £60M. Alliance route: Bluefors–Qblox (2025), Bluefors–Delft Circuits (2025)
Computing and simulation (§5.1.1): software, algorithms and quantum-AI	Where Europe's commercial quantum revenues are concentrated today, led by quantum-inspired and quantum-AI products deployed with industrial customers	Vertical integration by a European platform company (IQM–Quantistry, 2026)[38]

[38] Company disclosures, Bluefors, Qblox and Delft Circuits, 2024 to 2025.

Pillar	European position	Transactions already executed
Computing and simulation (§5.1.1): processors, across superconducting including bosonic and cat-qubit approaches, neutral atom, trapped ion, photonic and silicon spin	Credible European players in each family, but at markedly different stages of maturity: some families have scale-ups, others remain fragmented across several small companies	Intra-platform activity limited to date. Inbound loss: Oxford Ionics to IonQ (UK, $1,075M, 2025) Market access: IQM listed on Nasdaq (2 July 2026) and Nasdaq Helsinki (3 July 2026); Pasqal listed on Nasdaq (28 August 2026) with about €309M cash at closing, Euronext Paris indicated.
Sensing and metrology (§5.1.2): inertial, gravimetric, magnetometric and optical instrumentation	The pillar closest to commercial deployment, with public buyers that exist today; companies smaller and closer to product than elsewhere	Intra-European: iXblue–Muquans (FR, 2021); iXblue–ECA merger forming Exail (FR, 2022); Exail–Leukos (FR, 2025), extending into the enabling layer. Deals in this pillar are frequently unannounced.
Communication and security (§5.1.3): QKD, quantum networking, post-quantum cryptography	European origination of the technology; strategically exposed	Inbound loss: controlling stake in ID Quantique to IonQ (CH, 2025)
Hybrid integration, across pillars	European systems capability and public computing infrastructure; the near-term assembly point for hybrid classical-quantum capability	Integration partnerships rather than acquisitions to date

Four observations follow.

Consolidation by European companies is already happening, without designation and without a bespoke public structure. It happens where the acquirer has the commercial standing to execute which supports the argument about eligibility and capacity (§3.2) while removing the need for anyone to select on it.

It runs in both directions. Oxford Instruments sold its NanoScience cryogenics division to Quantum Design of the United States, and in the same layer Bluefors of Finland acquired Cryomech of Syracuse, New York, under CFIUS review. European enabling-hardware companies can and do buy American assets.

The enabling layer is where the outbound flow is heaviest. Hamamatsu Photonics of Japan acquired NKT Photonics of Denmark for €247 million, completing in June 2024, and holds a minority stake in Menlo Systems of Germany. Quantum Design of the United States acquired the NanoScience division of Oxford Instruments in January 2026 and Qnami of Switzerland in May 2026. NKT's lasers serve trapped-ion systems, Menlo's frequency combs serve optical clocks and metrology, and Qnami's diamond sensing came out of the University of Basel. These are component and instrument businesses in the pillar where Europe leads commercially, and each is now owned outside Europe.[39]

Alliances are a live alternative to mergers. The most significant recent alignments in the enabling layer have been partnerships rather than acquisitions: Bluefors with Qblox on integrated control, and Bluefors with Delft Circuits on cryogenic wiring. Where these deliver the same industrial result while preserving flexibility and competitive independence, they are not a lesser outcome, and policy should be indifferent between the routes.

The losses cluster where European commercial standing is weakest, not where European science is weakest. That is the pattern the remedies in this paper are addressed to (§3).

Read by pillar, the table shows a pattern. European companies acquire in the pillars where they already earn: three completed transactions in sensing and metrology, two in enabling

[39] Bluefors press release, 28 February 2023, acquisition of Cryomech Inc.; CFIUS approval.

technologies, one in computing software. Europe loses assets in the pillars where it does not: the processor and quantum-communications losses were both to the same American acquirer. Consolidation in Europe has happened where there is revenue, and acquisition by others has happened where there is not.

The record is incomplete in one direction. Transactions between privately held companies are frequently completed without announcement, and databases keyed on disclosed deal value do not record them. The sensing entries above are visible only because the acquiring group is listed. Any map of this sector will under-report the pillars whose companies are private.

The table should not be read as ranking the pillars, because they are not at comparable stages. Enabling technologies, sensing and metrology, and quantum software have European companies of genuine scale with commercial revenue. Processors reached scale later and by a different route: IQM and Pasqal both listed on Nasdaq in 2026, at $1.9 billion and about €1.7 billion respectively, on revenues an order of magnitude below those valuations. Quantum communications has no European company of comparable size, which is the more likely explanation for the loss of ID Quantique than any deficiency of science. Trapped-ion work in Europe is distributed across several small companies rather than concentrated in one of consequence, and the most valuable European trapped-ion asset was acquired from outside.

There is a geographic dimension too. Criteria weighted toward current commercial revenue will systematically omit ecosystems whose strength sits in research depth, industrial participation and national programmes rather than in booked sales. Germany is the clearest case: a revenue-ranked map would show almost nothing there. A criterion that produces a map with obvious holes in it is telling you something about the criterion, not about the countries missing from it.

Across the pillars the same pattern holds: Europe has many quantum startups and too few scale-ups, and consolidation cannot manufacture the missing stage. Where a pillar has no company approaching scale, the instrument that helps is demand and growth capital, not a merger.

5.4 Transaction structures

A share exchange executed alongside a public-private financing round in the acquirer, closed in the same window and with a secondary component that lets the target's investors take some cash, has been proposed as a way to buy when the acquirer's paper is not liquid. It can work, under two conditions that policy controls and two it does not.

What policy would have to change. Public instruments must be able to move at transaction speed, and at present they generally require a private lead investor and operate on committee cycles measured in quarters. Eligibility must also permit participation in a round whose purpose is an acquisition rather than organic growth.

What the market would have to supply. The acquirer needs a credible route to a market price, and a secondary component large enough to matter requires buyers willing to take illiquid positions at scale. Neither can be legislated.

What it will not do. The structure manufactures liquidity one transaction at a time. It does not deepen European capital markets, and a strategy relying on it would be engineering around the problem rather than solving it. It is a specialised instrument with a defined operating envelope, and the remedy at §3.2 is the general answer.

5.5 Listing, venue and control

A listing gives a company permanent currency to pay with. Where that listing sits is a separate question, and it is usually asked in the wrong terms. A European company can list outside the Union and stay domiciled, headquartered and staffed in Europe. A European listing guarantees nothing about where control sits. What keeps a company European is its corporate architecture: domicile, governance, intellectual property holding, and the composition and rights of its long-term shareholders. Not its ticker.

Sovereignty should be engineered through governance. A stable European anchor shareholding with board representation and blocking rights on change of control and on

transfer of key technology, combined with European domicile, IP covenants and the applicable screening regime, does durable work. These provisions apply to a listed company exactly as they did before listing. The anchor, not the exchange, is what keeps a champion European.

This holds only if "European" is defined in a way that cannot be satisfied trivially, and at present it is not. The United States determines corporate nationality principally by governance and control, and applies that test extraterritorially to an extent that reaches most of the world. Europe tends to look instead at where operations sit and where tax is paid: a test a foreign parent can satisfy by establishing a subsidiary, as has been demonstrated in other strategic sectors. A framework that engineers sovereignty through corporate architecture therefore needs a definition of a European company that turns on control, governance and ultimate beneficial ownership rather than on the location of activity alone. Without that, the locks described above secure a category that can be entered from outside.

Pasqal's 2026 listing is a worked example of the principle. The company listed on Nasdaq, is arranging a Euronext Paris listing afterwards, remains a French legal entity headquartered in Palaiseau with a French non-executive chair, and has the French public investment bank on its cap table and its board. Capital raised in New York, control retained in France.

Dual listing is an option worth understanding, not a requirement. A European venue alongside a deeper international one preserves European index eligibility, a European institutional and retail shareholder base, and a domestic market presence, while capturing the multiples and liquidity that make acquisition paper credible. There is a genuine strategic elegance to the arrangement: the world's deepest capital market financing acquisitions by a company whose control, domicile, IP and governance remain locked in Europe: inverting a flow that has run the other way for two decades, and having US investors welcome it as an opportunity.

It should nonetheless be presented as an option rather than a prescription. Dual listings are uncommon among growth companies and are materially more expensive and more complex to maintain than a single venue. Where the economics support one, a company will pursue it without being instructed to. And requiring a particular configuration for sovereignty reasons risks deterring listing altogether, which would defeat the purpose entirely.

Public money should not subsidise a venue choice. Lowering the threshold for a specific listing arrangement with public support would distort capital allocation without touching the condition that created the dilemma. If European venues deliver lower multiples and thinner liquidity than the alternatives, the answer is the agenda for deepening the capital base (§3.2), not a subsidy for companies to work around it. This is the clearest case in the paper where the structural remedy and the transactional one point in different directions, and the structural one should win.

The sequencing question has now been answered by events, and not in the way this paper would have advised. The argument above was that a company should consolidate where the market supports it, build revenue through demand and debt-financed growth, and list from commercial strength when scale supports reference multiples. Europe's two leading platform companies did the opposite. Both listed through special-purpose acquisition companies in 2026, at valuations an order of magnitude above their revenues, and both did so to obtain capital and a currency rather than to reflect commercial maturity they had already reached.

Whether that was right will be visible in their share prices over several years rather than in an argument here. What it establishes for policy is narrower and more useful. Listing was available to European quantum companies, on a US venue, at a scale that materially changes what they can do. The constraint the earlier sections describe is therefore not that European companies cannot reach public markets, but that the markets they reach are not European ones. That is an argument for the market-depth agenda at §3.2, and it is a stronger argument now that two companies have voted with their listings.

6. The Offensive Dimension: Acquiring Beyond the EU

Scaling is not only defensive. A European company with commercial standing and credible paper should acquire the pieces of the stack it needs wherever they are, in three concentric rings.

Ring 1. Switzerland and the United Kingdom. First-rate quantum ecosystems, culturally and scientifically integrated with the EU, outside its legal perimeter. The precedents cut both ways and both lessons matter: IonQ's purchase of Oxford Ionics proves UK assets are acquirable by scale-ups, and there was no structural reason the buyer had to be American; ID Quantique was a Swiss asset a European acquirer might have captured first. Ring 1 targets should be treated, for strategy purposes, as domestic.

Ring 2: the United States and Israel, opportunistically. Where intellectual property is valuable and a cap table is vulnerable, a funding round missed, a pivot failed, investors seeking an exit, European companies should bid. The United States has concentrated support on a small number of selected companies and taken equity in exchange: the Department of Commerce announced Letters of Intent on 21 May 2026 committing $2,013 million across nine companies under the CHIPS and Science Act, with a minority, non-controlling equity stake in each as a condition of the funds, and two Executive Orders followed on 22 June; assets outside that group will find US private capital scarcer, and the window for European buyers correspondingly wider. This is an observation about capital availability rather than a judgement about US industrial policy.[40]

Ring 3: selective assets in trusted jurisdictions (Canada, Japan, Australia) where alliances or acquisitions add stack components on acceptable terms.

The framing for policymakers matters. Outbound acquisition is sovereignty in the positive sense: it repatriates IP, patents, talent and customer relationships into European corporate structures. It is the difference between a Europe that protects what it has and a Europe that grows what it controls.

The rings are not a computing map. The European asset most consequentially lost to a foreign acquirer in recent years was a quantum communications company, not a processor company, and the enabling-technology suppliers described earlier (§5.1.4) are attractive targets precisely because they are profitable. Sensing companies, being closer to product and often smaller, are acquirable at prices that do not attract attention. Any watchlist that monitors only computing will miss most of the exposure.

It also imposes a discipline on the proportionate, cross-sectoral protection proposed below (§3.4). This is the point at which a sovereignty agenda most easily turns against the companies it means to help. Europe's strongest quantum companies are globally active by necessity. They sell to international customers, buy from international suppliers, raise from international investors, and, as the record of completed transactions shows (§5.1.4), acquire internationally. Bluefors' acquisition of an American company under CFIUS review is the clearest European precedent for outbound consolidation in this sector, and it happened because the transaction environment permitted it in both directions.

A protective regime designed only for the inbound case, and not tested against the outbound one, would restrict European companies' own transactions as a side effect. Strategic autonomy should not come at the expense of international engagement, and any screening framework should be assessed explicitly against the acquisition activity of the European companies it is intended to protect.

[40] IQM acquisition of Quantistry, 2026.

7. Annex: Watchlist of Issues to Monitor as the Industry Scales

#	Issue to watch	Risk if unmanaged	Remedy
1	Absence of a first-instance customer	Companies remain grant-dependent; no revenue, no currency, no acquisition capacity	Competitive procurement from Phase 0 (§2.1, §3.1)
2	Depth of European capital markets	Acquisition currency cannot be manufactured at transaction level	Savings and Investments Union; institutional access to growth-stage deep tech (§2.2, §3.2)
3	Procurement designed as allocation rather than competition	Revenue that evidences a relationship, not capability; selection criteria corrupted at source	Multi-vendor awards against published benchmarks, staged down-selection (§3.2, §3.1)
4	Demand concentrated on one pillar of the stack	Enabling hardware, the segment Europe leads, under-served	Demand channels across computing, communication, sensing and enabling technologies (§3.1)
5	IP transferred to public purchasers	Procurement builds a public asset instead of a company	IP retention with usage rights for procurers (§3.1)
6	Designation replacing competition	Administrative judgement substituted for market judgement; geographic capture; pipeline closed to entrants	Published eligibility; milestone-based competitive selection (§3.2, §4)
7	Revenue used as the primary eligibility criterion	Segment timing and revenue quality mistaken for merit; circularity once procurement is the revenue source	Plural published criteria; capacity and eligibility kept distinct (§3.2)
8	Investor exit rights in every target cap table	Deals blocked or targets sold to whoever offers cash	Cash and debt financing early; share exchange as acquirers reach the market (§2.3, §3.3)
9	Unlisted acquisition paper	Target investors exchange one illiquid position for another	Sequencing discipline; market access before share-exchange consolidation (§2.3, §5.5)
10	Exchange-ratio disputes between private companies	Transactions slower and more expensive	Contemporaneous pricing where available; not treated as fatal (§2.3)
11	Speed of public instruments vs. commercial windows	Support arrives after the opportunity has closed	Standing eligibility; once-only assessments; pre-cleared processes (§2.4, §3.2)

#	Issue to watch	Risk if unmanaged	Remedy
12	Over-reliance on public co-investment	Structures that require an alignment of conditions occurring rarely	Public participation alongside existing private interest, not substituting for its absence (§2.4, §5.4)
13	Cross-platform QPU mergers	Value destruction; integration failure	Intra-platform tracks; consolidate cross-platform layers instead (§5.1)
14	Framework blind to vertical integration	Europe's actual acquisitions classified as anomalies	Three geometries recognised; policy indifferent between them (§5.1)
15	Inclusive consolidation for political balance	Transactions politically desirable but not commercially justified	Asymmetric, selective consolidation on industrial rationale (§2.7)
16	Formal merger treated as the only route	Partnerships and supply-chain integration overlooked	Policy indifferent between routes; concern only with industrial result (§2.7)
17	Expectations placed on generalist incumbents as acquirers	Years lost waiting for buyers who will not come	Incumbents as anchor customers; acquirers are companies with commercial standing (§5.1)
18	Target economics ignored in triage	Acquisition programmes built around distressed assets that disciplined acquirers will not touch	Target-side commercial criteria acknowledged (§5.1, §3.2)
19	Founder and team retention through integration	Talent leaves after closing	Earn-outs, rollover equity, retention packages (§2.8)
20	Employee option portability across borders	Key staff disadvantaged by a transaction that benefits the company	Harmonised employee equity through a European vehicle (§2.5, §3.5)
21	Screening designed only for the inbound case	European companies' own outbound acquisitions constrained as a side effect	Cross-sectoral regime tested against outbound activity; screening distinguished from rejection (§3.4, §6)
22	Third-country acquisition of Ring 1 assets	Repeat of Oxford Ionics and ID Quantique	Ring 1 treated as domestic in triage (§6)
23	Missed distressed-asset windows abroad	Offensive opportunities lost to inertia	Standing capability for Ring 2 bids (§6)
24	All-equity consolidation	Founders and funds over-diluted; champions weakened by their own strategy	Procurement-backed lending, acquisition facilities, capex debt (§3.3)
25	Premature or sub-scale listing	Disappointments that damage sector sentiment	List from commercial strength (§5.5)

#	Issue to watch	Risk if unmanaged	Remedy
26	Listing structure mandated for sovereignty reasons	Listings deterred; capital allocation distorted	Sovereignty engineered through governance, not venue (§5.5)
27	Consolidated enabling-hardware supplier as a chokepoint	One European supplier facing every European QPU maker	Non-discriminatory supply, interoperability and open-interface commitments attached to public support (§5.1)
28	Platform taxonomy that classifies by branding rather than physics	Companies sharing a fab and control stack placed in different tracks; wrong consolidation perimeter	Classify by underlying platform; bosonic and cat-qubit approaches within superconducting (§5.1)
29	Fabrication treated as a procurement detail	Europe's semiconductor strength left disconnected from quantum industrialisation	Manufacturing recognised as a consolidation variable; Chips-side coordination (§5.1)
30	Corporate venture capital left out of the instrument set	An existing pool of patient, industrially informed capital stays on the sidelines	Co-investment and eligibility treatment for corporate strategic investors (§3.2)
31	Criteria that produce maps with obvious geographic holes	Selection artefacts mistaken for capability judgements	Plural criteria weighted for capital intensity; maps tested against known ecosystem strength (§3.2, §5.1.4)
32	Preference and openness conflated	Investment screening used as industrial policy; formation rate damaged	Preference in purchasing, openness in capital, screening narrowly targeted (§3.1, §3.4)
33	Strategy timed to the Act rather than to the instruments	Eighteen months lost waiting for legislation that consolidates rather than authorises	Begin under existing budgets, procurement law and instruments (§3, §4)
34	European acquirers obstructed inside the single market	Assets stay in Europe but cannot be consolidated; buying outside the Union becomes administratively easier than buying inside it	Intra-European obstruction addressed alongside third-country screening (§2.5, §3.4)
35	Regional or national equity creating geographic lock-in	The earliest public money sets a ceiling on where a company can grow	Union-level instruments as the neutral alternative (§2.5)
36	"European company" defined by location of activity alone	Sovereignty locks secure a category a foreign parent can enter by incorporating a subsidiary	Definition turning on control, governance and beneficial ownership (§5.5)
37	Enabling-hardware companies acquired for their revenue, with exclusivity imposed afterwards	Every European competitor loses supply security after the transaction has closed	Enabling layer treated as an early-warning priority (§5.1)

#	Issue to watch	Risk if unmanaged	Remedy
38	Publicly funded pilot lines inaccessible to the companies that need them	Capability investment nobody can fund alone simply does not happen	Industrial control over agreed capacity; incentives for host organisations (§3.1)
39	Export controls assessed on security grounds alone	Market share transferred to subsidised competitors developing behind protection	Industrial effect assessed explicitly alongside security (§3.4)
40	Talent advantage assumed rather than secured	Europe's largest quantum asset erodes as compensation gaps widen	Recognised as a precondition the strategy depends on (§2.8)

This paper is offered as a working contribution to QuIC's dialogue with the European Commission on the Quantum Act and the 2026 quantum roadmaps, Europe needs larger quantum companies, which is the objective the consolidation discussion has identified correctly. Getting there needs a customer that buys, capital markets deep enough to price a company, and public instruments that can act while an opportunity is still open.

8. About this Paper

This paper is published by QuIC. It was first drafted by **Enrique Lizaso, CEO of Multiverse Computing**, and revised by **Cécile M. Perrault, Executive Director of QuIC**.

It rests on a consultation of QuIC member companies, a call for evidence open to the whole community, and an expert workshop held on 18 September 2026 under the Chatham House Rule. One hundred and forty-eight comments were received and addressed. A policy brief summarising these recommendations is published alongside.

Contributing companies: **Alice & Bob, Bluefors, Bosch Ventures, Bull, Exail, Infineon, IQM, Pasqal, Qblox, QUBIZ, Quantonation and TOPTICA.**

Taking part in the expert workshop of 18 September 2026: **Bart van Ark** (The Productivity Institute), **Uwe Cantner** (University of Jena), **Chiara Criscuolo** (OECD), **Antoine Dechezleprêtre** (OECD), **Sampsa Samila** (IESE Business School) and **Reinhilde Veugelers** (KU Leuven and Bruegel), with representatives of Bluefors, IQM and QuIC. They took part in a personal capacity and in discussion only. They did not draft, review or comment on this text, and no view in it is attributed to any of them.

9. About QuIC

The European Quantum Industry Consortium (QuIC) is a non-profit industry association, founded in 2021, dedicated to the growth of the commercial QT sector. QuIC operates as a collaborative hub throughout Europe, bringing together hundreds of SMEs, large corporations, investors, RTOs, and academic institutions, to build a strong, vibrant ecosystem. Together, members of the association address topics of common interest, such as standardisation, intellectual property, trade, and workforce development. Today, QuIC is part of the coordination and support action of the Quantum Flagship – a European project, which aims to make Europe a dynamic and attractive region for innovative research, business, and investments in this field.

More information: www.euroquic.org

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