

Quantum technologies: the market is growing¹

Although still a distant business, industrial interest in quantum continues.

OUTLINE:

- **Market forecast:**

The total market for quantum technologies (computing, cryptography, sensing) will grow to US\$2.9 billion in 2030. Yole forecasts 18% and 30% CAGR for 2020-2025 and 2020-2030, respectively.

The three main market segments, quantum computing, quantum sensing / timing, and cryptography, will grow nicely between 2020 and 2030 to reach, respectively, US\$1,147 million, US\$598 million, and US\$1,163 million.
- **Application insights:**

Pharmaceutical is today attracting most of the attention for quantum computing. However, it will take many years (maybe 20 to 30) before quantum is extensively used in medical and pharma applications.

Quantum computing will be ready to be used in 5-10 years for drug development (when there is already an identified drug candidate).

For drug discovery, it will be ready in 10- 20+ years.

Following the adoption of quantum in Pharmaceutical, other applications could follow:- energy, chemistry, transportation, banks, and finance could adopt quantum computing in 10+ years.
- **Supply chain:**

Since 2012, investors have shown interest in start-ups in quantum. And 2020 was particularly active for investments.

Since 2012, almost US\$2 billion (including computing, software, cryptography, and sensors) have been invested in about 80 start-ups, with companies developing hardware receiving the largest share (60+%).

Largest investments are in North America: PsiQuantum (photonic quantum processor), D-Wave (superconducting qubits), IonQ (trapped ions), Rigetti.

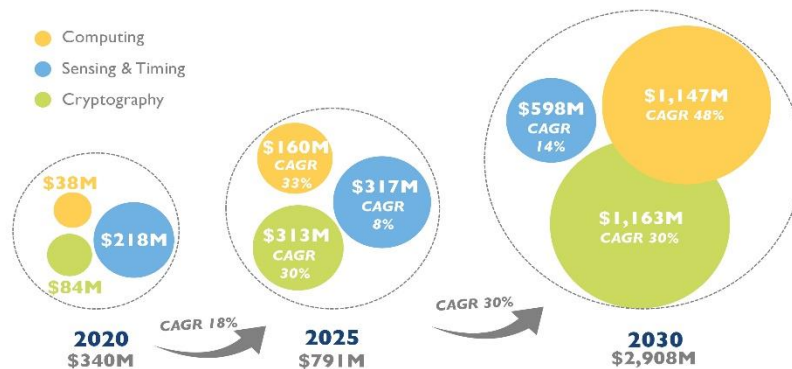
Europe also has a quantum champion with IDQ in Switzerland.

¹ Extracted from: [Quantum Technologies 2021 report](#), Yole Développement, 2021

“Quantum technology covers a wide range of applications addressing key industrial simulation and optimization challenges.” asserts **Eric Mounier, Ph.D., Director of Market Research at Yole Développement (Yole)**. He adds: “These span chemicals/materials research, logistics, financial services, healthcare, life science, manufacturing and defense, drug discovery, protein structure prediction, investment risk analysis, feedstock management, vehicle routing, and network optimization. It is also a critical national issue for many countries as it addresses secure communications and database management linked to national security.”

2020-2030 market forecast for quantum technologies

(Source: Quantum Technologies 2021 report, Yole Développement, 2021)



For more than 20 years, Yole has developed its semiconductor activities by enlarging step by step its expertise in technical innovations and disruptions. Through this development, the company has grown with dedicated activities focused on a wide range of emerging technologies, including quantum computing, quantum sensing, metamaterials, wet-ware, neuromorphic, and more.

Released today, the [Quantum Technologies 2021 report](#) includes market trends and forecasts, supply chain, technology trends, technical insights and analyses, take-aways, and outlook. This study delivers an in-depth understanding of the ecosystem and leading players’ strategies and enables a thorough understanding of the value chain, infrastructure, and players in quantum technologies and the quantum computing market.

What are the economic and technological challenges of quantum technologies? What are the key drivers? What will the market look like in 2030? Who are the companies to watch, and what innovative solutions are they working on?

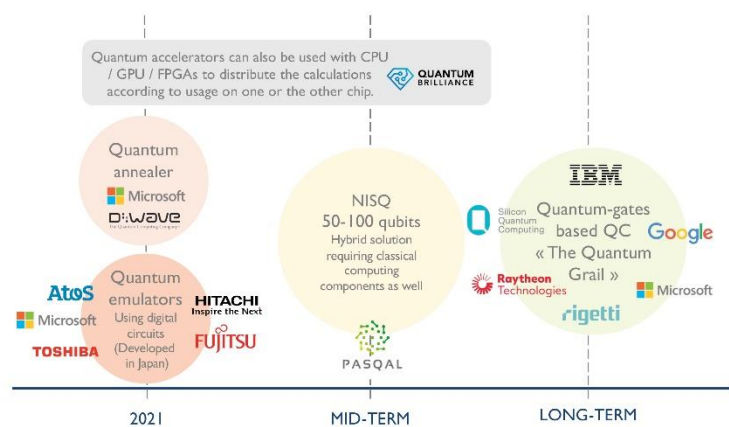
Yole presents today the status of quantum technologies.

As analyzed by Yole’s team in the new [Quantum Technologies 2021 report](#), quantum computing is still subject to technological and timing uncertainty, but investments continue. Medical and pharma applications are interesting, promising markets, but it seems that inorganic markets are « simpler » to address than medical markets for quantum technologies in the

short term. In the next decade(s), extensive R&D will continue to define qubit solutions, quantum computer architectures, software, and business models. The supply chain will consolidate as well, and we could soon see the first acquisitions. Cryptography, sensing, and timing are already existing markets and will continue to grow. QKD could experience a market boost with 5G. The total value for quantum technologies, including computing, cryptography, and sensing, will grow from about US\$340 million in 2020 to US\$2.9 billion in 2030. QaaS² will be 65% of the total.

2021 quantum computer roadmap

(Source: Quantum Technologies 2021 report, Yole Développement, 2021)



There is a long road before companies realize a universal quantum gate-based computer. Today, only one company – D Wave in Canada – is manufacturing and shipping quantum annealers. Although they use 2,000 to 5,000 qubits, these Ising machines are today restricted to optimization problems. Quantum emulators are another topic, one where Japan is strongly involved. The next step will be to develop NISQ³ machines with 50-100 logical qubits. Then the holy grail will be to develop a universal quantum computer with a minimum of 100 logical qubits, corresponding to 100,000 physical qubits.

Recently, another approach has emerged with the development of quantum accelerators. These will be used in conjunction with CPUs⁴ and GPUs⁵ or FPGAs⁶ in HPCs⁷. Calculations will be distributed according to usage on one or the other chip, quantum or non-quantum. This is a mid-term approach to the use of hybrid quantum computers using both semiconductor logic chips and quantum accelerators with well-defined and distinct roles.

As part of its products and services, Yole's team offers a collection of reports covering such technologies. A detailed description of these reports is available on i-Micronews.com, reports section.

² QaaS: Quantum as a Service
³ NISQ: Noisy Intermediate Scale Quantum
⁴ CPU: Central Processor Units
⁵ GPU: Graphics Processor Units
⁶ FPGA: Field-Programmable Gate Arrays
⁷ HPC: High Performance Computer

Ensure you are up-to-date with the latest news coming from the industry and get an overview of our activities, including interviews with leading companies and more on [i-Micronews](#).



In this regard, do not miss the LASER World of PHOTONICS Industry Days. **Eric Mounier, PhD, Director of Market Research at Yole Développement** will participate to the roundtable “Quantum – Quo Vadis?” on Thursday, June 24. Register [here](#).

Stay tuned!

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About our analyst

With more than 25+ years' experience within the semiconductor industry, **Eric Mounier PhD.** is Director of Market Research at Yole Développement (Yole). Eric provides daily in-depth insights into current and future semiconductor trends, markets, and innovative technologies (such as Quantum computing, Si photonics, new sensing technologies, new types of sensors ...). Based on relevant methodological expertise and a strong technological background, he works closely with all the teams at Yole to point out disruptive technologies and analyze and present business opportunities through technology & market reports and custom consulting projects. With numerous internal workshops on technologies, methodologies, best practices, and more, Yole's Fellow Analyst ensures the training of Yole's Technology & Market Analysts. In this position, Eric Mounier has spoken in numerous international conferences, presenting his vision of the semiconductor industry and the latest technical innovations. He has also authored or co-authored more than 100 papers, as well as more than 120 of Yole's technology & market reports. Previously, Eric held R&D and Marketing positions at CEA Leti (France). Eric Mounier has a Ph.D. in Semiconductor Engineering and a degree in Optoelectronics from the National Polytechnic Institute of Grenoble (France).

About the report

Quantum Technologies 2021

Industrial interest in quantum technologies continues, leading to major investments and a large market in 5-10 years. – Performed by Yole Développement

Companies cited:

IQBit, A*Quantum, A.P.E., Alibaba, Alice&Bob, Alpine Quantum, Amazon, Ankh.I, Anyon Systems, ApexQubit, AppliedQubit, ArQit, Artiste-qb.net, AtomComputing, AtomSensors, Atos, Aurea Technology, Aurora Quantum Technologies, Automatski, Axion Technologies, Beit.tech, Black Brane System, Bleximo, BlueFors Cryogenics, Bosch, Boxcat, Bra-Ketscience, BraneCell, Cambridge Quantum Computing, Coax Co., ColdQuanta, Cryoconcept, Cryomech, Cryptalabs, Cryptomathic, CryptoNext Security, D slit technologies, Delft Circuits B.V., Deutsche Telekom, D-wave, EeroQ, Elyah, Entanglement Partners, Entanglement Technologies, Entropica Labs, EvolutionQ, Fathom Computing, Fujitsu, Google, GTN LTD, h-bar, Honeywell, Horizon, HP, HQS, Huawei, HyperLight, IBM, ID Quantique, imasenic, InfiniQuant, Intel, Intelline, IonQ, IQM, Isara, Jos Quantum, Ketita Labs, KETS Quantum Security, Kiutra, Labber Quantum, LightOn, Lockheed Martin, Luminous, MagiQ, MDR, Microsoft, M-Labs, M Squared, Multiverse Computing, Muquans, and more...

Related reports:

- [Silicon Photonics 2021](#)
- [Neuromorphic Computing and Sensing 2021](#)

About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services as well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole Group of companies has expanded to include more than 80 collaborators worldwide...

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