



The Quantum Leap April 5, 2022

Quantum Computing Jobs

While I might be dating myself with this reference, a formative film of my generation is “The Graduate,” starring a very young Dustin Hoffman as Benjamin Braddock. There is a scene at Ben’s college graduation party when Ben is given advice by Mr. Maguire, his dad’s friend:

- **Mr. Maguire:** I want to say one word to you, Benjamin. Just one word.
- **Ben:** Yes, sir.
- **Maguire:** Are you listening?
- **Ben:** Yes, I am.
- **Maguire:** Plastics.
- **Ben:** Exactly how do you mean?
- **Maguire:** There is a great future in plastics. Think about it. Will you think about it?
- **Ben:** Yes, I will.
- **Maguire:** Okay. Enough said. That’s a deal.

If this film were made today, I expect that “Plastics” would be substituted with “Quantum Computing.” It seems today as if the business world is exploding with Quantum Computing (QC) activity, including \$3.5 billion in raised and announced start-up funding in 2021 and \$30 billion in total public funding announced through 2021. This has led to a large and growing ecosystem of global players including 196 start-ups, 17 incumbents, 57 public/government agencies and 169 academic groups. [McKinsey & Company, 2022]. These various and disparate entities are all in a mad scramble to attract talent, and while “quantum physics scientist” and “quantum programmer” are obvious categories of need, the diversity of skills and talent currently being sought for positions in QC organizations is quite broad. Here is a summary of advice I have for players in, or interested in entering, the QC world:

Target Audience	Advice
Quantum Companies	<ul style="list-style-type: none"> • Make long-range staffing plans • Leverage job placement professionals/headhunters
Broad Industry	<ul style="list-style-type: none"> • Sponsor continuing education • Empower internal champions • Host postdocs
Job Seekers	<ul style="list-style-type: none"> • Network aggressively • Upskill: Roll-up your sleeves via on-line learning (i.e., EdX, Coursera, Udemy, etc. offer many quantum courses) • Get on GitHub, etc.; start programming on Qiskit/Cirq/Forest/Strawberry Fields, etc.; learn Python
Students	<ul style="list-style-type: none"> • Join or start a quantum club on campus • Push your university to create quantum majors or physics/computing dual-majors • Seek internships and summer programs in QC

Let's unpack some of this with some additional details (including many embedded hyperlinks which I hope you find useful).

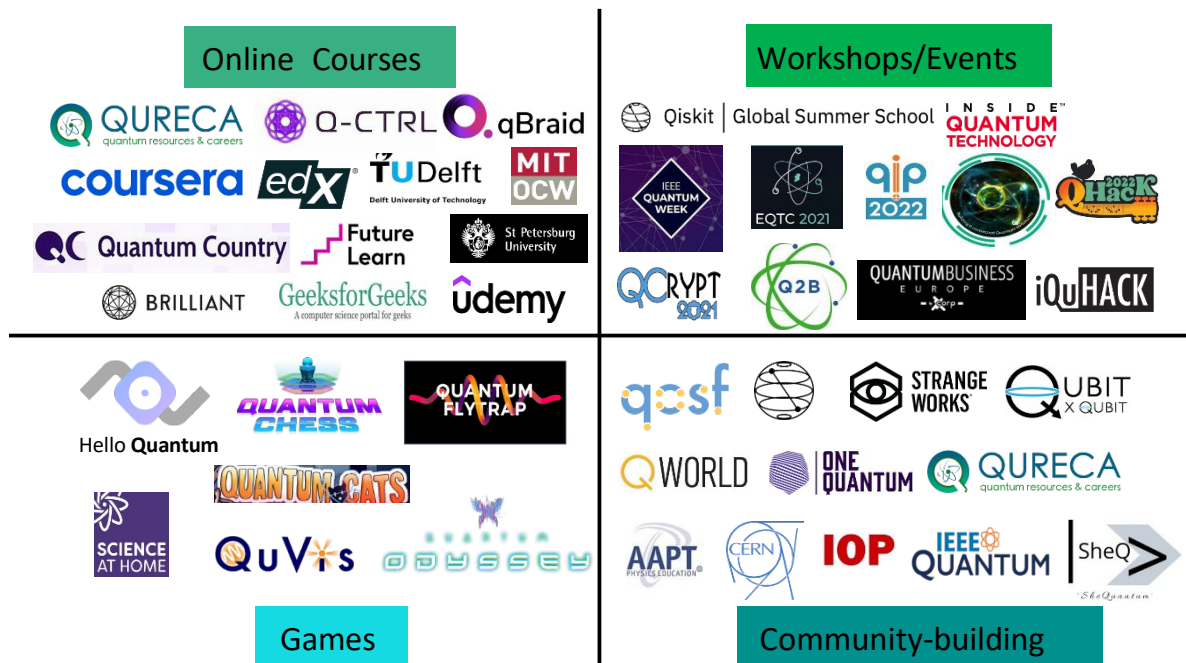
Companies

Companies actively in the QC space, and those considering bringing QC capabilities to their businesses should do so with urgency. This is a fast-evolving space and laggards risk missing the boat or not being prepared once QC resources are able to achieve things unachievable today. In fact, this is becoming a growing focus and is beginning to make its way to the boardroom. Karina Robinson, CEO of Robinson Hambro Ltd., a firm providing CEO/Advisory services and Board search, organizes the City Quantum Summit, an annual Quantum event held at the Lord Mayor of London's Mansion House, intended to attract CEO's and CTO's. She believes that "this is the year where it really will become a board issue and recommends that most large companies will need a non-executive board member that understands Quantum Computing and is able to talk with the CTO about it."

With an ever-expanding number of start-ups, companies, universities, large corporations, and government agencies focusing on quantum technologies, the problem of a skills shortage cannot be ignored. "QURECA (Quantum Careers and Resources) is the first online training and recruitment platform that provides online courses and resources to fill the gaps in the existing quantum community. With a mission to create global opportunities in quantum technologies and train the future quantum workforce QURECA has launched a non-technical course '[Quantum for Everyone](#)', a specialized series in Quantum Finance in collaboration with QuantFi, and its educational platform has been used by global quantum companies such as Zapata Computing." [Kaur and Venegas-Gomez, 2022].

Another QC advocate, Terrill Frantz, Professor of eBusiness and Cybersecurity and Quantum Information Science at Harrisburg University of Science and Technology, hosts a number of QC events and databases including 'Quantumapalooza', which is a dynamic listing of free online

learning resources in Quantum Computing, currently listing 18 different courses and events. I encourage companies to explore resources such as [QURECA](#) and [Quantumapalooza](#) and the many others available on-line [additional examples noted in the graphic below] to expand their internal knowledge about QC and to offer such resources to their employees.



SOURCE: KAUR AND VENEGAS-GOMEZ, 2022

Given the broad and evolving QC landscape and the need to find the best talent in terms of fit, I also suggest utilizing a professional recruiter/headhunter to fill key roles. Be prepared for the search to take quite some time (i.e., 3-6 months), but leveraging a professional headhunter should make the process as efficient as possible. Some firms that specialize in quantum-related hiring include [Quantum Futures](#), [Entangled Positions](#), and [Robinson Hambro](#) among others.

Job Seekers

According to Connor Teague, President and Quantum Talent Partner of Quantum Futures, a London based staffing and recruiting firm, “Last year there was an influx of quantum algorithm hires and demand for PhD’s in physics. There recently has been a transition to hardware, anyone coming from a master’s in electrical engineering or even a bachelor’s.” That trend away from advanced and specialized degrees is a natural effect of the talent shortage in Quantum, and this shortage is now extending throughout quantum businesses. According to a paper published in August 2021, “we find a range of job opportunities from highly specific jobs, such as quantum algorithm developer and error correction scientist, to broader job categories within the business software and hardware sectors. These broader jobs require a range of skills, most of which are not quantum related.” [Hughes et al, 2021]

As Herman Collins, executive search specialist and CEO of Herman Collins LLC and StrategicQC LLC noted, “what you’re seeing is diversification of positions in terms of





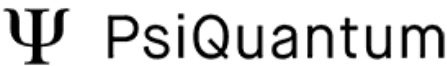


marketing, business operations, finance, etc. And that just reflects a broadening of the acceptance of Quantum in the business community. And that continues to grow.” Now that QC has begun to evolve out of the lab and into industry, businesses are finding themselves needing to fill out their staffs with lots of non-quantum roles. “Business developers on the path to quantum revenues, marketing types to share the quantum message in a common language manner, conventional computer scientists who can create seamless integration with quantum, human resource staff to fill the growing number of roles – all crucial to the achievement of quantum success.” [Lenahan, 2021]

For those of you interested in transitioning your career into QC, Connor Teague suggests you “get messy on GitHub...show your future employer that you’ve been consistently trying to upskill after hours.” Getting certifications and/or simply taking on-line courses about quantum computing will help differentiate candidates.

Herman Collins added “An ideal situation would be to go to your current employer and say, ‘I have an interest in this area and this is how it might affect our company going forward...and someone here should be involved and knowledgeable about it and I’d like to be that person.’ Get your current company to invest in you, and, de facto invest in the company by having you as a resource.” Perhaps such a company will allow you to take classes on company time and/or help pay for courses that aren’t offered free.

Another resource led by Terrill Frantz and Harrisburg University of Science and Technology, is the QED-C “[Quantum Jobs](#)” database, which lists job posting by QED-C member including corporations, academic institutions, national laboratories and government agencies working in quantum. As of 4/2 there were 640 open positions posted on this site, a good number of which are for non-technical hires. In addition, a quick scan of the “Careers” section of many of the large QC players, highlights a larger number of total openings and a growing number of non-science roles, highlighted in the table below.

Non-science Quantum Jobs

Company	Website Open Job Postings	Select Non-Science Role(s)
	18	Global Payroll Manager
	22	Legal Counsel; Graphic Designer
	31	Human Resource Generalist; Business Ops Controller; Federal Contracting Lead; Marketing Lead; M&A Corporate Dev. Lead
	11	Director of Marketing; Business Dev. Executive – Pharma
	42	Contract Attorney; Facilities Manager; Product Manager
	30	Compensation/HRIS Analyst; Contracts Manager; Sr. Strategic Supply Chain Negotiations Manager
	46	Senior HR Generalist; Contracts Specialist; Legal Operations Manager; Buyer/Planner; Contracts Billing Manager
	23	Operations Manager; Patent Engineer; Web Designer
	39	Business Analyst; Senior Product Manager; Procurement Buyer; Customer Support Analyst
	15	Assistant Controller; HR Director; Business Analyst

This is just a representative sampling. Many additional companies and positions are listed among various job-related resources.

Students

Naturally, the best way to optimize your chances of getting a prime role at a QC company would be to get a QC related PhD. When I asked Herman Collins for advice to college students he said, “I would tell them to position themselves where they had the greatest leverage, combined with their own personal interest. The greatest leverage comes from having a PhD in physics. It gives you the greatest leverage and the greatest bargaining chips and is the most sought after. Do you need one? Certainly not, but it does pay. It does pay to have one.”

The next best thing other than a PhD would be a Master's degree. However, Terrill Frantz, who also maintains the only bona fide list of all the master's degree level QC programs in the world notes that as of today there are only 37 programs listed. And at the Bachelor's level, many colleges do not offer a QC degree to undergraduates, but are increasingly adding curriculum. However, most offer courses in quantum mechanics in the physics department and various computer classes within the computing department, so considering a dual major and/or seeing if your school would offer or create a degree leveraging those two departments should be considered.

As Araceli Venegas-Gomez of QURECA noted, "We of course provide recruitment services, but we also provide education – those additional skills. We prepare people and we place them into specific projects which we call Fellowships. We enable companies unsure about hiring someone to enable them to work on a project and see if there is really value added to the company. That person then also has an opportunity to see if they enjoy working in industry or whether instead, they should stay in academia." So, finding internships or summer programs or "Fellowships" is a great way to formally explore a career in QC before taking the full-time plunge.

If you do opt to join the QC workforce out of school, as Karina Robinson noted, "In a growing industry, if you get in early, you can shape your job. And when you're working at a small firm that is growing you end up doing a bit of everything, whatever your job title is. And therefore, it can help you develop a career path which may end up at some other deep tech company or you may go into a think tank or all sorts of other things. But whatever you do with Quantum will be useful, whether you continue in Quantum or go into another sector."

Conclusion

So, when I get invited to college graduation parties, I will be whispering "Quantum Computing" into the ears of the recent graduates. It's also great advice to those seeking a change in their current career and while technical aptitude and experience create the best fit for most of the current QC industry positions, there is a growing number of non-technical jobs in QC as well. There are many great resources available to you as you consider a QC career and I hope you take advantage of them and consider joining this exciting and evolving field.

I want to thank Christopher Bishop, the host of Inside Quantum Technology's [QuantumTechPod](#) (among Chris's various activities), for his generous time, input and suggested introductions for this post, and for providing a template for the non-quantum job postings included herein.

References:

Teague, Connor. President and Quantum Computing Talent Partner, Quantum Futures. Interview. Conducted by Russ Fein, March 9, 2022.

Robinson, Karina. CEO of Robinson Hambro Ltd. Interview. Conducted by Russ Fein, March 14, 2022.

Frantz, Terrill. Professor of eBusiness and Cybersecurity; Quantum Information Science, Harrisburg University of Science and Technology. Interview. Conducted March 14, 2022.

Venegas-Gomez, Araceli. Founder and Director of QUERECAL. Interview. Conducted by Russ Fein, March 15, 2022.

Collins, Herman. CEO of Herman Collins LLC and StrategicQC LLC. Interview. Conducted by Russ Fein, March 16, 2022.

Leddy, Chuck, “[Q&A: The talent shortage in quantum computing](#)” MIT News, January 23, 2019

Lenahan, Brian, “[Quantum Talent – Shortages and Tactics](#)” Quantum Strategy Institute, December 3, 2021

C. Hughes, D. Finke, D. German, C. Merzbacher, P. Vora and H. Lewandowski, “[Assessing the Needs of the Quantum Industry](#)” Fermilab/physics.ed-ph, published on arXiv August 25, 2021

Flaherty, Nick. “[US summit on quantum industry highlights skills shortage](#)” eeNewsEurope. October 11, 2021

“[Closing the quantum computing talent gap](#)” CyberTalk.org, August 4, 2021

“[Quantum Computing Grows Its Following with Investments and Experiments on the Rise, According to IDC](#)” IDC.com. May 19, 2021

Hughes, Owen. “[Quantum computing skills are hard to find. Here’s how companies are tackling the shortage](#)” ZDNet. November 12, 2021

McKinsey & Company, “[The Rise of Quantum Computing](#),” from their webpage accessed April 2, 2022.

If you enjoyed this post, please visit my website and enter your email to receive future posts and updates:
<http://quantumleap.blog>



Russ Fein is a venture investor with deep interests in Quantum Computing (QC). For more of his thoughts about QC please visit the link to the left. For more information about his firm, please visit [Corporate Fuel](#). Russ can be reached at russ@quantumleap.blog.