T_ F._._.D_._._
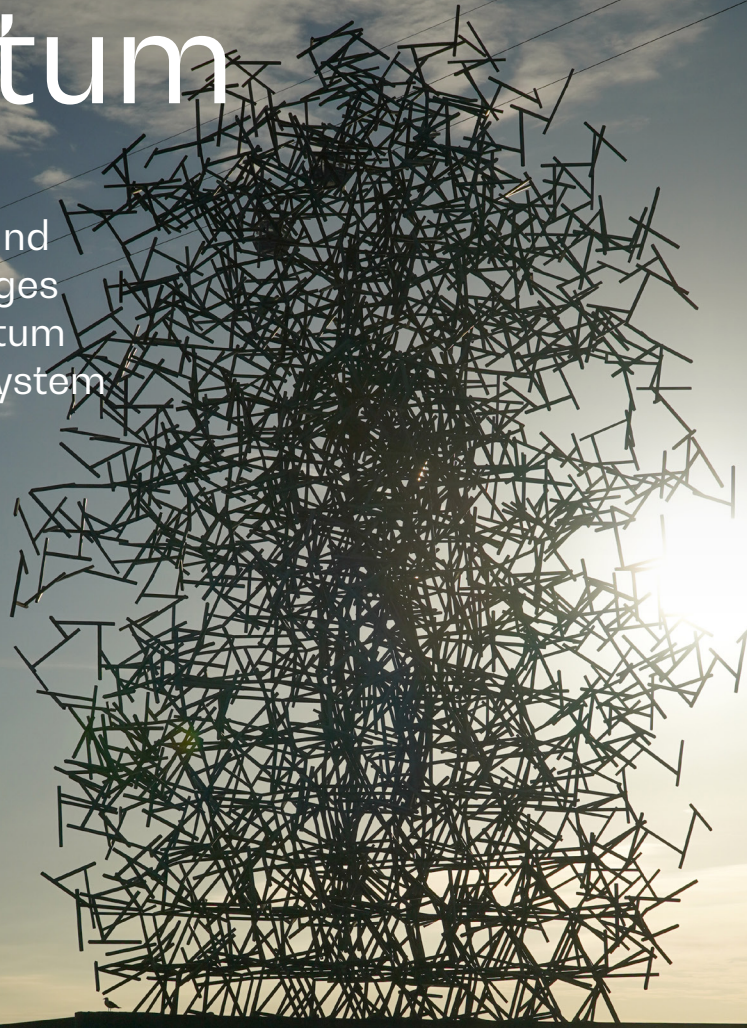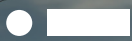
Communicating Quantum

Overcoming the
communications and
marketing challenges
faced by the quantum
technologies ecosystem

● ▬

The Quantum Collective, part of TFD, a strategic communications consultancy based in London, held a roundtable discussion with leaders in the quantum technologies ecosystem. Held under Chatham House rules, the discussion focused on the challenges and strategies for better communicating quantum technologies to key audiences. Participants represented quantum hardware companies, investors, and government organisations, and came from technical, operational and marketing backgrounds.

This report summarises the insights from that discussion and offers the outline of a strategy for communicating this fascinating, world-changing emerging technology going forward, within the UK and beyond.

Where companies are named and quotes are attributed, it is done only with the express approval of the participants.

Defining Quantum

Quantum is currency

There is no doubt about it, the word 'quantum' is equipped with an intrinsic currency – indeed, 4 of the 7 companies who attended the roundtable use 'quantum' in their name. The word has extraordinary power: financially and, increasingly, socially and culturally. But defining the word, defining the branch of physics it describes in a meaningful way, is a roadblock met by anyone involved with developing and commercialising this technology and it is a challenge that each party has a vested interest in overcoming.

Know your own definition

Quantum Exponential highlighted that conversations with investors tend to reveal that most people have not heard of quantum technologies – and if they have, only quantum computing. 'Quantum' is often considered as one deep and emerging technology in a mix with many others, such as AI, cryptocurrency and machine learning. To allay confusion, they define the quantum industry primarily as the products and business of the atomic. He added, 'it's a different revolution, it's a different asset class, it's a completely different set of products'. Quantum Exponential, a quantum-only fund and accelerator, has clearly defined its own parameters for what qualifies as a quantum product, investing only in companies which generate at least 70% of their revenue from quantum technologies.

> "
> It's a different revolution, it's a different asset class, it's a completely different set of products.
> "

Making your definition accessible ▬

Visualisation and analogies are important when explaining what quantum means, particularly to a non-technical audience. While this might involve explaining the intricacies of the physics involved, this is often superfluous. Most people, even those who are interested in technology, do not understand how their laptop works or what a classical bit is, so it is unrealistic to expect that the majority of audiences will understand – or care – how, on a deeply physical level, a quantum computer works.

An explanation focusing on what something looks like and how it acts on and is influenced by its environment, is often more helpful. One can understand how a clock, the size of a shoebox, based on quantum mechanics, that liberates humanity from its reliance on classically engineered and hackable GPS signals, is beneficial for national security, without needing to understand the intricacies of the physics inside it.

Quantum is not science fiction ▬

One participant shared that as a company they have focused on emphasising that quantum is not as alien and inaccessible as some voices in the industry, fueled by various media hype cycles, have suggested up to now. The motivation for this is a recognition that if we place the technology on a pedestal, apparently reachable only by those with quantum physics PhDs, adoption will slow dramatically.

There has been a striking explosion in new technologies in recent years. While previously, computing companies would rack and stack only standard x86 architecture, now, TVUs, inference machines and AI accelerators are all commonly integrated hardware. Quantum computing is another example, albeit unique, which will eventually become a part of that overall fabrication.

> " If we place the technology on a pedestal, apparently reachable only by those with quantum physics PhDs, adoption will slow dramatically. "

Messaging Pitfalls

Drop the qubit

Journalists, influenced by the messaging pushed by large quantum computing players, are hung up on the qubit. The group emphatically agreed that starting every article with a blurb defining the qubit is: unnecessary, often boring, inaccessible to most audiences. Why do we have to define a qubit to define a quantum computer? It has the effect of alienating the audience and further mystifying quantum technologies, pushing their potential impacts even further from consideration.

> " The qubit is: unnecessary, often boring, inaccessible to most audiences. "

Drop quantum

Going one step further, several participants took issue with the word quantum itself, pointing out that it is an adjective that we have appropriated to describe a huge range of technologies. Using quantum sensing or, to put it another way, properties that happen to be quantum for the improvement of sensing, is just better sensing. We do not necessarily need to define it as quantum sensing.
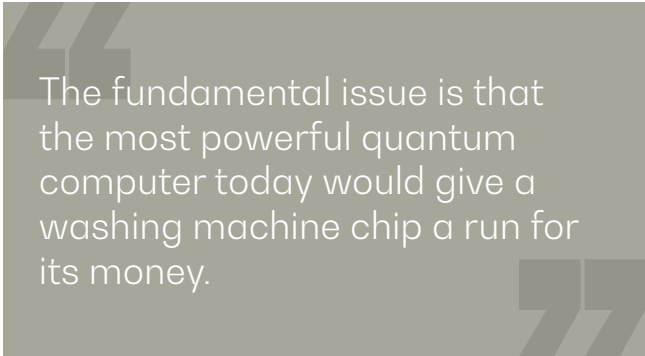
> " We should be looking at hundreds of things, we should be saying, 'use this, figure it out, it will have economic value, and use it today'. "

Use cases: help or hindrance?

Of everything we discussed during the roundtable, the participants returned frequently to debating the benefit or otherwise of focusing on the use cases and applications of quantum technologies. This was certainly the most divisive topic and shed light on the crux of the communication challenge for the quantum computing ecosystem: the fundamental issue that the most powerful quantum computer today would give, as one participant put it, a washing machine computer chip a run for its money.

We should avoid overpromising on specific use cases quite simply because we do not know specifically how this technology will pan out. The way to bring end users along on this journey and develop use cases is not to dictate how the tool is used but to provide the tool and encourage experimentation.

While some participants pointed out that de-emphasising the use cases of quantum technologies might encourage companies to think that they can sit and wait before implementing the technology, one speaker summed it up concisely: 'while companies should not sit and wait, we also should not build a use case that has to sit and wait for the technology to catch up. We should be looking at hundreds of things, we should be saying, "use this, figure it out, it will have economic value, and most importantly, use it today."'
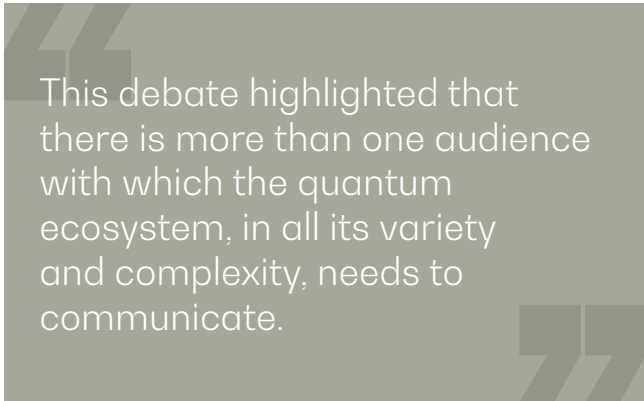
> The fundamental issue is that the most powerful quantum computer today would give a washing machine chip a run for its money.

Doing everything everywhere all at once

While many of the attendees felt that promoting the idea of the 'killer application' for quantum computing is both misleading and potentially dangerous for the future of the industry, one participant highlighted that classical computing did not start as a multi-purpose, general use tool. It was developed to overcome very specific problems. The speaker commented 'I do wonder if there has been an approach in the quantum industry to mirror what exists within the classical computing industry, but to mirror where it is today, not the journey it went on to get there.'

This debate highlighted that there is more than one audience with which the quantum ecosystem, in all its variety and complexity, needs to communicate. There is an audience of scientists and engineers who are developing the technology who are driven mostly by the fact that this is an entirely new, totally cutting-edge endeavour. As one speaker put it, 'it's nice that they're used for something. But that's never what's driven me, I'm doing it because it's great fun and nobody has done it before!' There is also an audience of taxpayers who want to see use cases, impacts and implementations. There is an audience of businesses and boards who want to see the impact of the technology on their bottom line. A disservice has been done to the industry where we have tried to conflate these audiences and ended up communicating poorly to all of them as a result.

> This debate highlighted that there is more than one audience with which the quantum ecosystem, in all its variety and complexity, needs to communicate.

Refocusing Communication

Speak the right language ▬

Because the centre of gravity of quantum technologies communications has largely been the qubit, and deeply technical concepts such as entanglement and superposition, many groups who fall outside of this remit have switched off. One participant pointed out that biologists as a group have lost interest because there has been too much discussion about quantum bits and qubit modalities. The biologist, however, can calibrate what the physicist measures. They said, 'We have to start figuring out how to be more inclusive of the fact that we don't actually know what we're reading and we need the biologists, the clinicians, and the chemists who can correlate that data back into something we can actually interpret.'

As a field, quantum technologies – or rather, the way they are communicated outwardly – has become too insular and physics-focused at the expense of reaching out to and involving other scientific domains that could provide critical insight and validation. We need to change the way we're talking about it now; we need the biologists now.

> " We need to find a higher ground on which we can communicate. "

Beyond the biologist ▬

We discussed how the communications problem goes beyond just other groups in the scientific community. Many quantum technologies developments are made not by specialists but by those in the companies who are using the technology. We need to put the technology in the hands of the workforce because we do not know the talent we have until people start playing with it. 'There's a whole workforce out there, we just need to get involved.'

And, if we start with the qubit, we lose that audience. To upskill the current workforce, it is not necessary for the large proportion of them to go back to the beginning and learn everything from scratch. 'We need to find a higher ground on which we can communicate; where we can say, this is how you operate a quantum computer, this is what you can do with it now, this is the potential we think it might have.'

Investors and the public ▬

While the group broadly agreed that the mainstream public is not yet the key audience to which we need to communicate the benefits of quantum technologies, there was a general feeling that the industry is not facing the public as much as it should. Several participants expressed a hope that the various national quantum strategies published in the last year will start investing time in this.[1]

There was also general agreement that communicating with the taxpaying public and investors is where use cases come into their own. And not just climate modelling or drug discovery, but detailed, specific instances which exhibit the benefits of a particular technology. An example might read like this: Novo Nordisk spent ten years developing Ozempic. They have since realised that drug discovery using quantum technologies could bring that process down to two, so instead of developing a blockbuster drug which brought in $3.3 billion in one quarter every ten years, they can do it every two. That is the reason they have invested $200 million in the Niels Bohr Institute of the University of Copenhagen to build a full-scale generally applicable quantum computer before the end of 2034.

Turning quantum into a tangible product is how we get the investors and the public on board.

Quantum is horizontal, not vertical ▬

The representative from the Danish Embassy, who works to attract foreign investment into Denmark specifically in the technology sector, shared his experience of communicating with a Danish audience. He said, 'in conversations – with my friends, ministers, investors – I come up against this idea that there is AI, biotech, cleantech, cybersecurity, fintech and quantum.' He went on to explain, 'I try to reframe it as - there are all these vital fields, and then there's the umbrella architecture of quantum technologies, which will enable and enhance them all. I have found this especially helpful with a Danish audience, because in Denmark, traditionally, we have excelled in two emerging technologies – life sciences and cleantech. Positioning quantum technologies as something which will make us even better at these things, well that really resonates.'

In this example, we have moved far beyond the qubit and much closer to a real-world, tangible and tailored commercial prospect. As another participant put it, the messaging should be: 'Quantum is the next wave. It's the next fundamental infrastructure. It's the latest foundation of the house that's being built. And it will impact holistically across multiple verticals.'

> " I try to reframe it as - there are all these vital fields, and then there's the umbrella architecture of quantum technologies, which will enable and enhance them all. "

1. In light of this, it is interesting that Ireland's National Quantum Strategy, published 15 November, has as one of its five pillars building "awareness of quantum technologies and real-world benefits across a broad range of stakeholders". It states that the objective "of this pillar is to have a quantum-literate society that takes full advantage, for everyone, of the benefits quantum technologies can bring".

Building Awareness and Adoption

Measuring progress ▬

The table agreed that milestones should be agreed to allow the industry to progress. Ideally, these should be detached from the very abstract concept of the qubit and detached from the potentially dangerous minute use case. The one because it's confusing and scary, the other because it limits innovation. 'We need to agree as an industry what the milestones are and then all go after them.'

One participant highlighted the acceptance of failure as the difference between a successful and unsuccessful attempt at defining milestones: 'we need to fail and learn from failure. Without repeated failure we're never going to succeed. The problem with the qubit rate is you can't fail. There's no winning or losing, it's just a metric that doesn't matter.'

Though some attendees felt that milestones should be universal across the ecosystem, others felt that vertical specific milestones make more sense, considering some pockets of the industry are so far advanced ahead of others.

All agreed that the tech ecosystem is not the only audience for which milestones matter; milestones that are easily accessible to a business audience are just as important. These may come in the form of cost, time and labour savings.

So, you're not a quantum computing company? ▬

While the discussion, and this report as result, focused mainly on the communications challenge for quantum computing specifically, we touched throughout on the comms and marketing challenges faced by other quantum technologies. Broadly, it seems that both quantum computing and non-computing quantum technologies have a marketing problem. With computing there is a preconception of what it should be, which is often unfounded or misleading. With, for example quantum sensing or quantum cryptography, there is no preconception of what it should be, so it expends much energy explaining what it is. This is an unfortunate use of time and energy considering that those other quantum technologies are, in the main, advanced far ahead of quantum computing.

One non-computing company participant highlighted that when large companies set up small, specialised quantum-focused teams, those groups often spend their first year simply reviewing quantum computing before realising there are complementary quantum technologies and hybrid solutions available today for testing. They explained, 'It's about helping those teams shortcut the learning curve to understand what certified solutions exist already so they can start leveraging them right away.'

'One of the questions we get asked most frequently is "So you're not a quantum computing company - what do you actually do?" For us, those conversations are really important.' They continued, 'We absolutely fit into the quantum sector, but our products are deployable now, alongside other companies' market-ready solutions. It's crucial we showcase to large enterprises how they can take small, incremental steps to steadily embed quantum capabilities across the organisation. They may have a narrow mental picture of what 'quantum' means, so illuminating the full landscape of possibilities is essential.'

Leverage credible industry voices ▬

The group agreed that going forward, the key turning point will be the moment at which large companies start talking widely and publicly about the fact that they are investing in and using quantum technologies. It's the companies that will push the investors that will push the government to take action.

Speaking to the companies and the end-users is now the most important audience the ecosystem should focus on. This should include explaining how implementing quantum technologies will have a considerable commercial impact; impressing on them a sense of urgency and the benefits of early adoption; and helping them build their workforce capabilities. This could also involve helping the small quantum teams in large companies draft messaging so they can communicate effectively within their own company and elevate quantum to the c-suite and board.

One participant pointed out that the Novo Nordisk's activity is in large part the reason why Denmark now has such a strong national quantum strategy. If the biggest company in Europe talks publicly about its level of investment in a technology then its government tends to follow suit.

Again, we returned to discussing the advantage or otherwise of focusing on use cases. Many participants felt that at this relatively early stage of technological development and adoption, the important thing is not showing benefit but showing that companies are spending time and money on exploration and implementation. Perhaps the quantum ecosystem should take a leaf out of the UK Government's book, which recommends that any communication for the GOV.UK website should be written for a 9 year old reading age. How do you explain to a 9 year old why they should do something? Because their peers are.

At present, the ecosystem in the UK is suffering from the fact that the large financial institutions, which tend to be the earliest adopters of and biggest investors in new technologies, are not making bold, public statements such as 'we are pursuing QKD' or 'we've gone quantum-safe'. As an industry we have to normalise the adoption of this technology and we need the investors and the banks to be the first users. We need them to be saying, 'of course we're doing quantum key distribution, we would be foolish not to.' As one participant noted, surprisingly, no major UK company has yet followed the high-profile examples of Novo Nordisk, Amazon, Google or IBM in visibly tapping into the country's formidable academic quantum talent by providing substantial financial backing – or at least not publicly.

> " They may have a narrow mental picture of what 'quantum' means, so illuminating the full landscape of possibilities is essential. "

> " If the biggest company in Europe talks publicly about its level of investment in a technology then its government tends to follow suit. "

How you can
get involved

Are you looking for support communicating quantum or other deep tech topics? Get in touch with The Quantum Collective for a free PR and marketing consultation.

Keen to share your quantum expertise? We'd love to hear from you if you're interested in contributing to our next report or attending our next event.

Reach out today at
thequantumcollective@wearetfd.com.

T_ F._.D_..

Unit 3.4, The Department Store Studios,
19 Bellefields Road,
London, SW9 9UH

wearetfd.com

in **TFD - Think Feel Do**

○ **@tfdthinkfeeldo**

✕ **TFDThinkFeelDo**