



ARCHER

Goldman Sachs Emerging Tech Series
Investor Presentation 28 April 2022

Research & Prototype Foundry Archer operates in,
Sydney, Australia.

Disclaimer

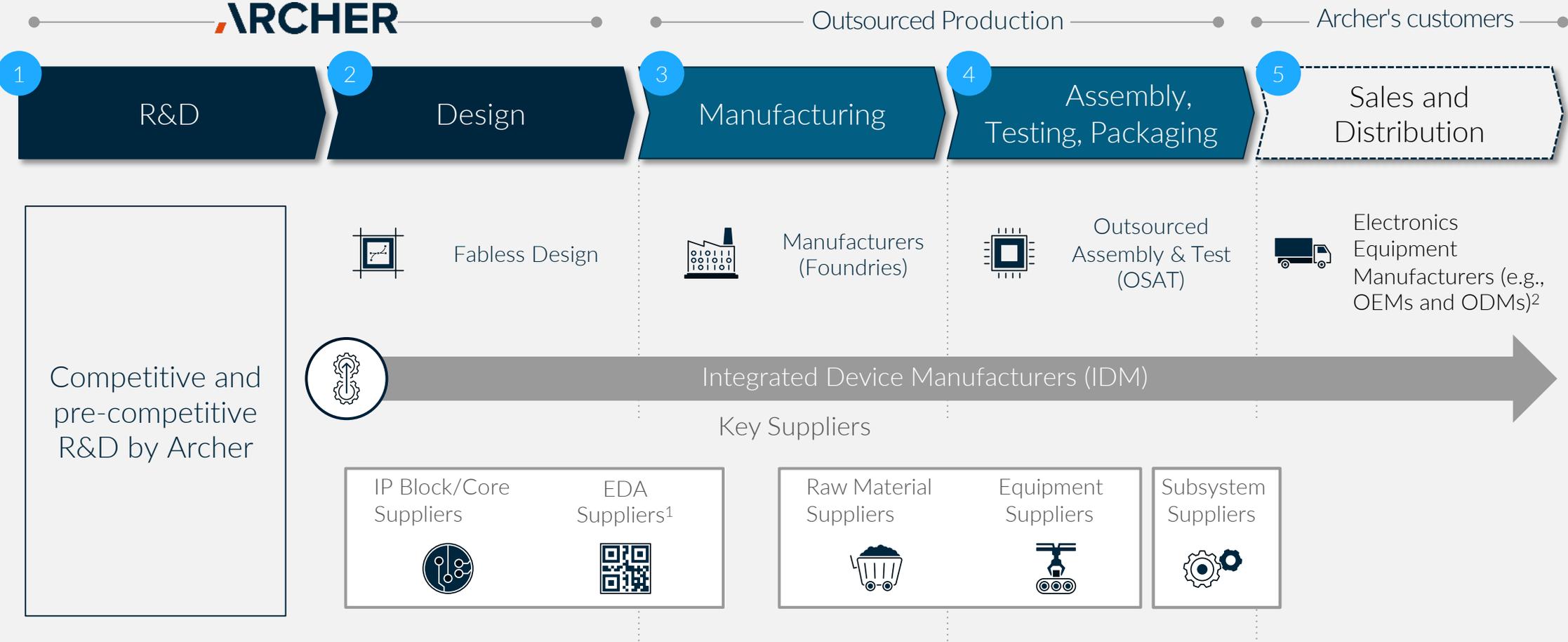
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Archer is developing advanced semiconductor devices that are relevant to quantum computing technology



1. Electronic Design Automation; 2. Firms engaged in branding, marketing, designing, and manufacturing electronic equipment that incorporates semiconductor content into electronic products including Original Equipment Manufacturers (OEM) and Original Design Manufacturers (ODM); Source: Gartner; BCG Analysis



**ARCHER IS ONE OF A FEW
COMPANIES IN THE WORLD
DEVELOPING A QUANTUM
COMPUTING PROCESSOR**

Archer is a pure-play deep tech that is long-term value driven...

... creating value by



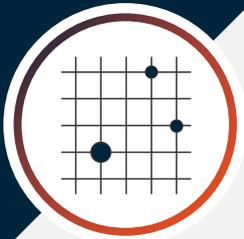
Attracting and retaining pioneering innovators and technologists



Working with global computing giants, high growth venture SMEs, and Tier 1 international tech institutes



Technology development backed by world-class R&D



Patents granted in the US, China, South Korea, Japan, and Europe – including UK and Germany



Efficient use of funds with A\$28.3M cash and no corporate debt*



Access to \$1B+ of deep-tech infrastructure and facilities

The Archer team is led by pioneering nanotechnologists, physicists, chemists, and semiconductor engineers



Dr Mohammad Choucair *FRACI FRSN GAICD*, CEO. RACI Cornforth Medallist for the most outstanding Chemistry PhD in Australia. Alumni of AGSM UNSW Business School. Former World Economic Forum Global Councillor. Inventor of the ^{12}CQ quantum computing technology. Honorary Fellow of the University of Sydney.



Dr Martin Fuechsle *MRSN*, Quantum Tech Manager. AIP Bragg Gold Medallist for the most outstanding Physics PhD in Australia. Inventor of the single-atom transistor heralding the limit of Moore's Law. Honorary Associate of the University of Sydney.



A/Prof. Dr Matthew Broome *MinP*, Quantum Tech Manager. Awarded the prestigious Marie Curie Fellowship. Fabricated and measured the world's first two-qubit device in a donor-based silicon quantum processor.

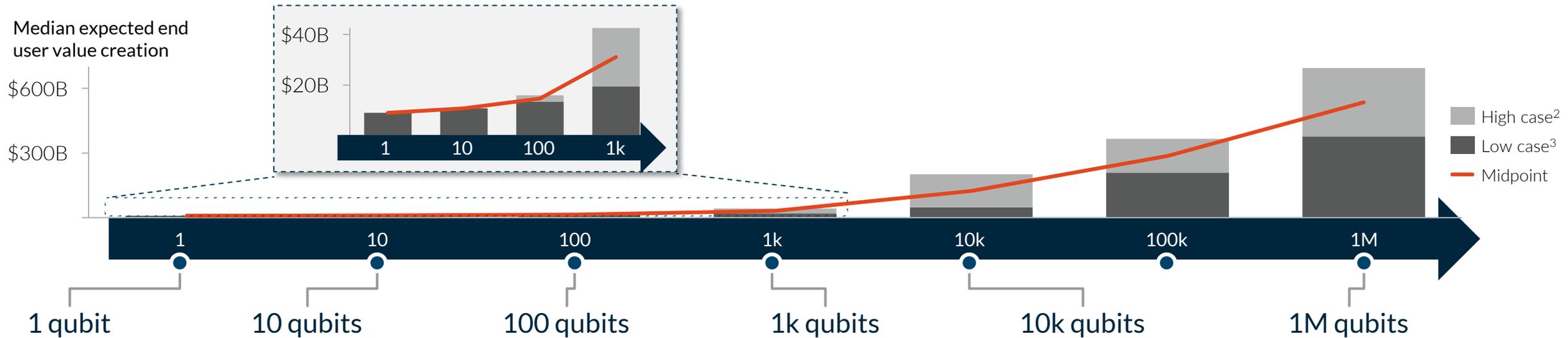


**QUANTUM
COMPUTING IS
REVOLUTIONARY
DEEP-TECH**



The potential of quantum computing increases with qubit volume, but even one qubit could bring incredible value to end users

End user value creation expected to reach between US\$450B and US\$820B at 1M qubits



Applications where quantum surpasses classical solutions based on number of qubits¹

Quantum sensing	Improved sensing and QRNG	Classical assisted quantum algorithms (e.g. VQE)	Classical-assisted machine learning	Quantum network applications (e.g. transmitting quantum information)	Advanced search Optimisation
Quantum random number generation ('QRNG')	Classical-assisted Monte Carlo simulations				Machine learning and AI
	Non-quantum advantaged compute				Materials research, chemical simulation

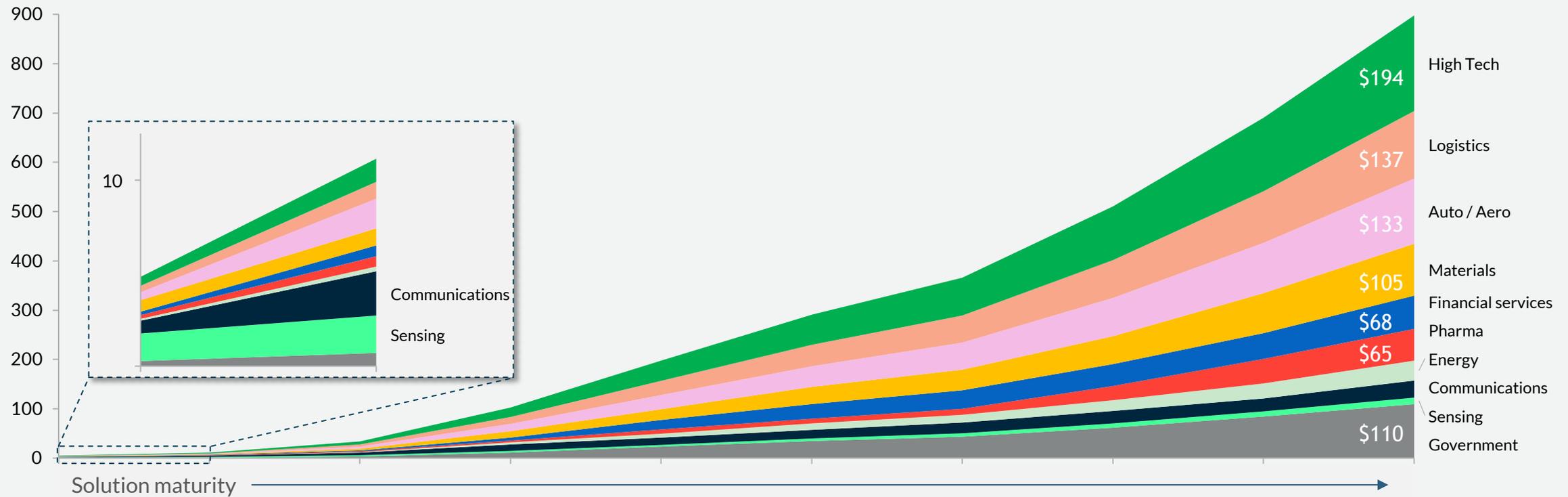
1. Physical qubits. 2. High case based on 100:1 ratio of physical to logical qubits. 3. Low case based on 1000:1 ratio of physical to logical qubits.
Source: Krelina, "Quantum technology for military applications" EPJ Quantum Technology (2021); Perdomo-Ortiz et al, Quantum Sci. Technol. (2018)

US\$900B in value creation for end users as quantum computing reaches maturity

Current: Quantum Comms. and Sensing most mature markets

Future: Quantum computing expected to drive transformative value across sectors

Value created for end users (US\$B)

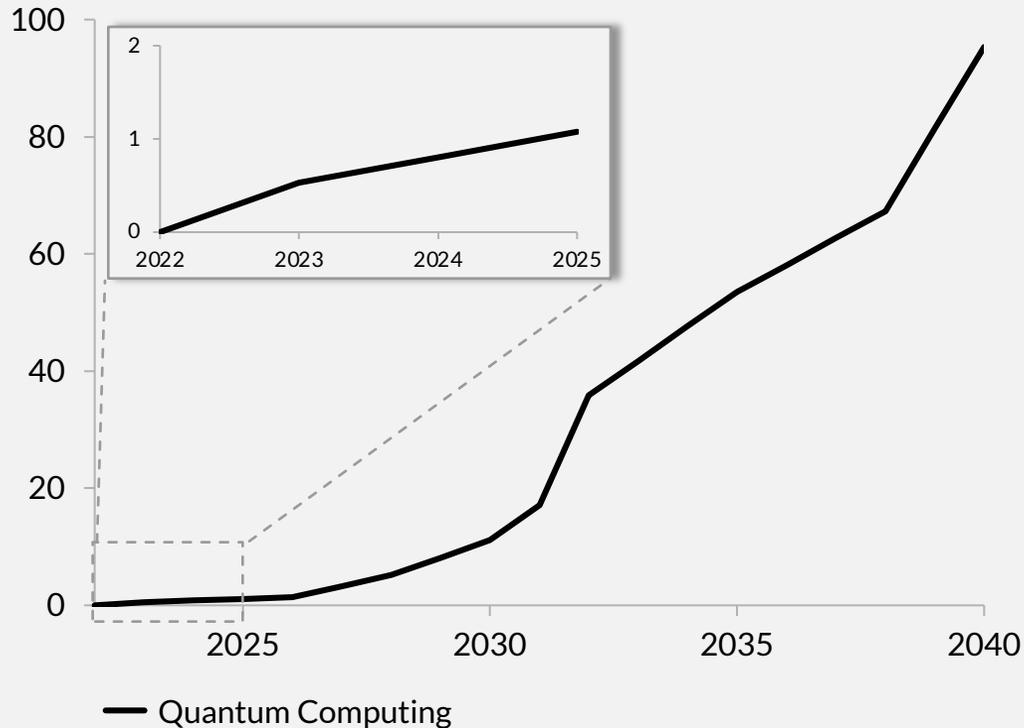


Note: End user value creation defined as incremental revenue/value generated for the end user in using quantum technology, including Quantum Computing, Quantum Communications and Quantum Sensing. Auxiliary revenue from quantum technology not included.
Source: BCG analysis

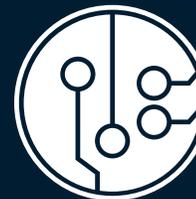
The quantum market is growing rapidly...

...expected large scale adoption **after 2030**

Estimated market size (US\$B)



Adoption of quantum computing expected to increase with quantum hardware maturity



Quantum cloud providers have announced a goal of moderate to high quantum maturity by 2030

Note: Auxiliary revenue from quantum technology not included.
Source: BCG analysis

Source: Krelina, "Quantum technology for military applications" EPJ Quantum Technology (2021); IBM quantum roadmap; IonQ quantum roadmap



Era of Quantum Computing

Value for investors in the quantum computing economy is expected to increase as quantum hardware is developed:

- + The Australian Government's Blueprint and Action Plan for Critical Technologies sets a national vision & strategy for critical technologies, including quantum technology[‡].
- + The CSIRO[§] reported Australian quantum tech could create A\$4 billion revenue and 16,000 new jobs by 2040.
- + The US National Quantum Initiative Act was signed into US law on Dec 21, 2018* with the US planning to invest US\$170+ billion on advanced tech**.
- + The International Roadmap for Devices and Systems lists Quantum Computing a key tech in the 'post-Moore' era[‡].

[‡] <https://www.pmc.gov.au/resource-centre/domestic-policy/blueprint-critical-technologies> and <https://www.pmc.gov.au/resource-centre/domestic-policy/action-plan-critical-technologies>

[§] <https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/csiro-futures/futures-reports/quantum>

* <https://www.congress.gov/bill/115th-congress/house-bill/6227>

** <https://www.congress.gov/bill/117th-congress/senate-bill/1260>

[‡] https://en.wikipedia.org/wiki/International_Roadmap_for_Devices_and_Systems

**^{12}CQ has unique advantages
over other quantum tech...**

... with potential for



Highly sensitive mobile use cases with co-located encryption and compute



Low-latency, on-premise integration inside data centres



Simplicity in operation and maintenance



Compatibility with smaller form factors, e.g. mobile

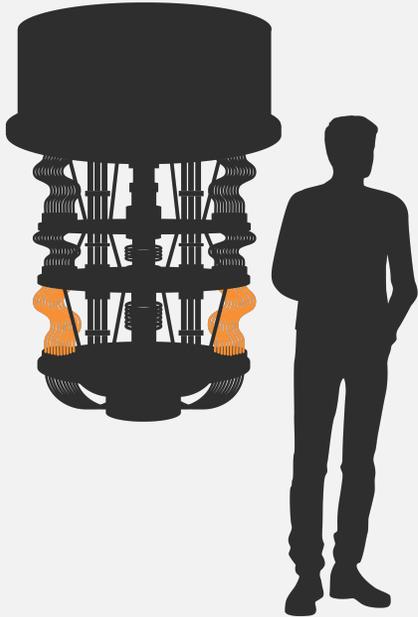


Integration with common electronics



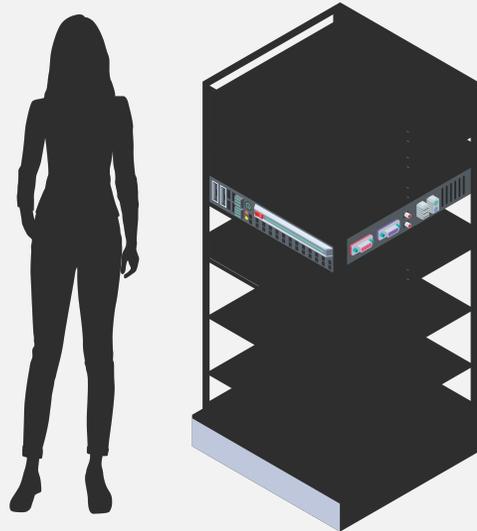
Room-temperature operation

Potential solution to push quantum access and use beyond cloud and edge...



Cloud-based

Require ultra-low temperatures and infrastructure to operate.
Accessed via the cloud.
e.g. Superconductor, silicon, topological.



Edge and/or Cloud-based

Operate at room temperature but are difficult to integrate into modern devices. Installed on-site.
e.g. Photonic, ion-traps, diamond.

... to your mobile

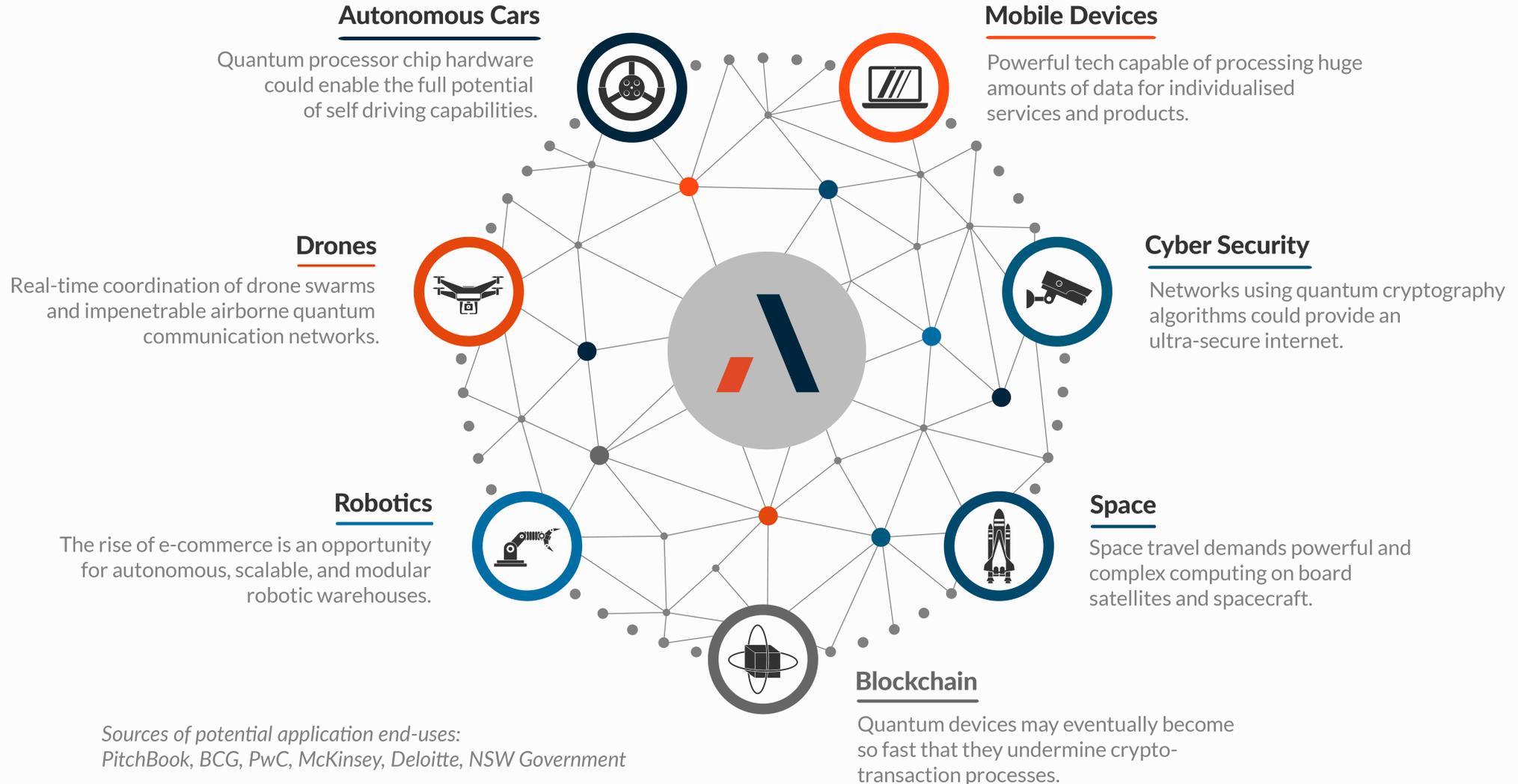


Quantum Powered Mobile Devices

QPMDs will require practical qubit processors that integrate into modern devices.
e.g. ^{12}CQ chip development.

In-depth analysis: <https://www.bcg.com/en-au/publications/2021/building-quantum-advantage>
More information, by Dr M. Choucair, Mar 26 2021: <https://www.ibm.com/blogs/ibm-anz/why-quantum-deserves-your-attention/>

Archer expects ¹²CQ quantum technology to enable industry-wide innovation



Opportunity to integrate ¹²CQ into 150 million+ devices



Datacentres

12 million

Units ordered globally 2021



Mobile

147 million

US smartphone shipments in 2021



Computers

19 million

US personal computer shipments Q1 in 2022

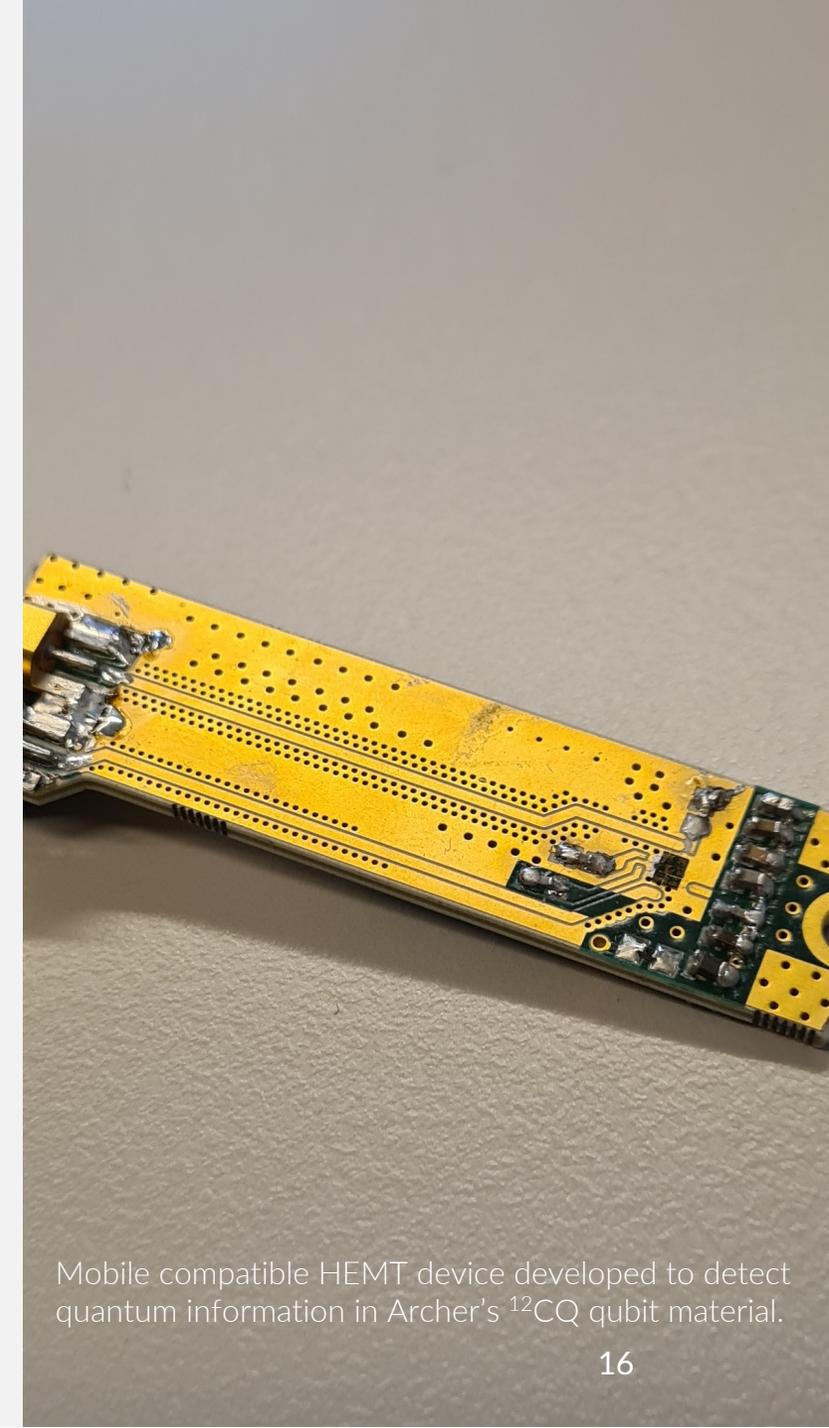
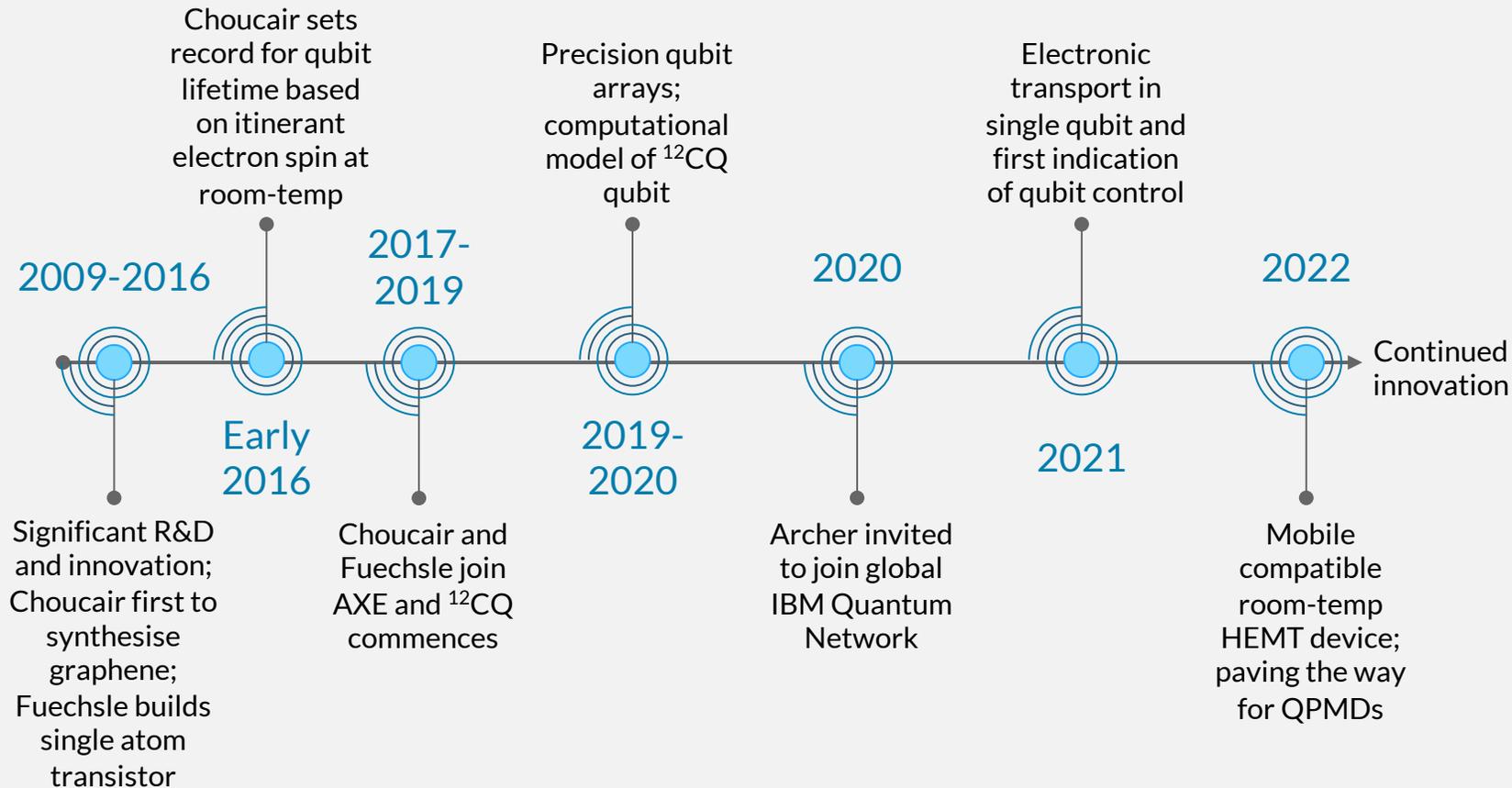


Point-of-sale

659 thousand

Restaurants needing POS terminals in the US in 2020

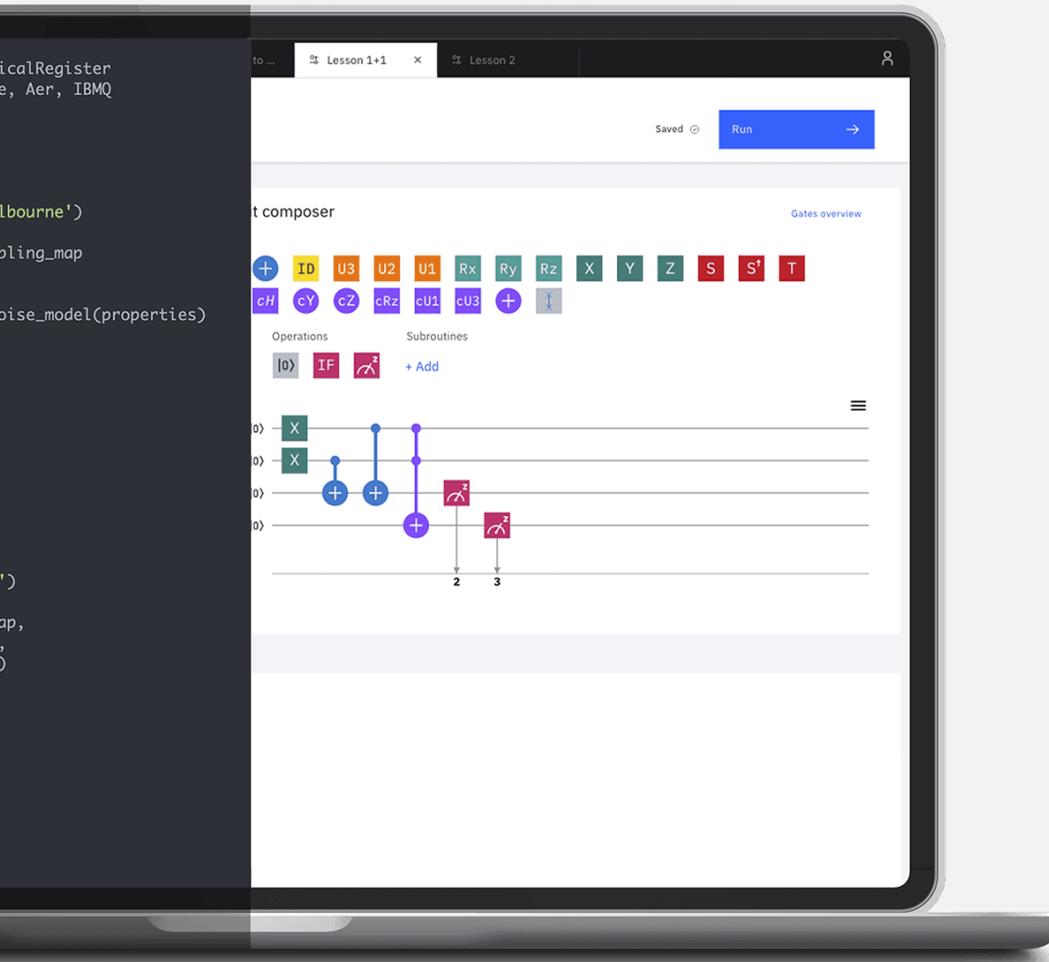
Archer's record setting innovation is at the forefront of international quantum development



Mobile compatible HEMT device developed to detect quantum information in Archer's ^{12}CQ qubit material.



† References: <https://www.nature.com/articles/nnano.2008.365>; <https://www.nature.com/articles/nnano.2012.21>; <https://www.nature.com/articles/ncomms12232>; <https://pubs.acs.org/doi/10.1021/nl202866q>; <https://doi.org/10.1016/j.carbon.2014.03.046> <https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2017091870>



IBM's Qiskit interface showing a quantum computing gate compiler. Image sourced from IBM website.

Global Partnerships

Archer entered into an agreement with IBM to collaborate on the advancement of quantum computing, supporting:

- + Archer's plans to use Qiskit as the software stack for ^{12}CQ chip processors and to participate in the global IBM Quantum Network[†].
- + The Company's access to the IBM Quantum Computation Center, which includes the most advanced quantum computers available to explore practical applications.
- + The demonstration of Qiskit's flexibility, integrating with different quantum hardware (e.g. ^{12}CQ chip processors) to accomplish the goal of enabling *practical* quantum computing applications.

[†]ASX announcement 4 May 2021.

The quantum journey
requires Archer to break
through barriers...

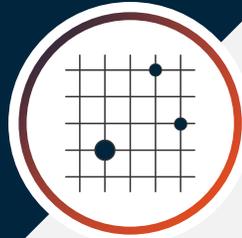
...by systematically
pushing each limit



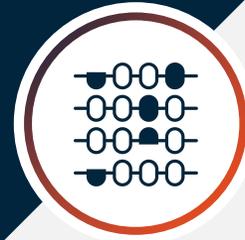
Growing the Archer team and expanding access to world-class tech development infrastructure in Australia and abroad



Establishing and strengthening strategic commercial partnerships



Patent prosecution and portfolio growth towards grant in Australia and Hong Kong



World-first tech development towards **1 qubit** with mobile compatibility

ASX Code: AXE

ACN: 123 993 233

The Board of Archer authorised this announcement to be given to ASX.

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