

ASX Announcement ([ASX: AXE](#))

26 October 2021

Corporate Presentation

Archer Materials Limited (“Archer”, the “Company”, “[ASX:AXE](#)”) is pleased to provide shareholders the attached Corporate Presentation. The updated Corporate Presentation better reflects the Company’s focus, strategic priorities, and activities as a pure-play deep technology company after having recently completed a A\$25 million capital raise (before costs), sold its mineral exploration business, and changed its GICS code to ‘Semiconductors’.

About Archer

Archer is a technology company developing advanced semiconductor devices, including chips that are relevant to quantum computing and medical diagnostics. Archer’s flagship development, the ¹²CQ chip, is a world-first qubit processor technology that could allow for quantum computing powered mobile devices (‘QPMDs’).

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

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For more information about Archer’s activities, please visit our:

Website:

<https://archerx.com.au/>

Twitter:

<https://twitter.com/archerxau>

YouTube:

<https://bit.ly/2UKBBmG>

Sign up to our Newsletter:

<http://eepurl.com/dKosXI>

A photograph of a modern building with a glass facade, featuring a courtyard with trees and a bench. The building's glass reflects the sky and surrounding greenery. In the foreground, there is a paved area, a tree with green leaves and small white flowers, and a wooden bench. The overall scene is bright and modern.

ARCHER

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

/ Disclaimer

The material contained in this document is a presentation of general information about the activities of Archer Materials Ltd and its related bodies corporate (together the “Archer Group”), current as at the date of this presentation. It is provided in summary and does not purport to be complete. You should not rely upon it as advice for investment purposes, as it does not take into account your investment objectives, financial position or needs. These factors should be considered, with or without professional advice, when deciding if an investment is appropriate. To the extent permitted by law, no responsibility for any loss arising in any way (including by way of negligence) from anyone acting or refraining from acting as a result of this material is accepted by the Archer Group, including any of its related bodies corporate.

This document may contain forward-looking statements with respect to the financial condition, results of operations, and business strategy of the Archer Group. These forward-looking statements are based on estimates, projections and assumptions made by the Archer Group about circumstances and events that have not yet taken place. Although the Archer Group believes the forward-looking statements to be reasonable, they are not certain. Forward-looking statements involve known and unknown risks, uncertainties and other factors that are in some cases beyond the Archer Group’s control, and which may cause actual results, performance or achievements to differ materially from those expressed or implied by the forward-looking statements (and from past results). The Archer Group makes no representation or warranty as to the accuracy of any forward-looking statements in this presentation and undue reliance should not be placed upon such statements. Forward-looking statements may be identified by words such as “aim”, “anticipate”, “assume”, “continue”, “could”, “estimate”, “expect”, “intend”, “may”, “plan”, “predict”, “should”, “will”, or “would” or the negative of such terms or other similar expressions that are predictions of or otherwise indicate future events or trends. The forward-looking statements included in this presentation speak only as of the date of this presentation. The Archer Group does not intend to update the forward-looking statements in this presentation in the future.

This presentation contains information which was reported in ASX announcements lodged between 1 October 2017 and 25 October 2021 (together the “Announcements”). All material assumptions and technical parameters set out in the Announcements continue to apply and have not materially changed. The Announcements can be viewed online at <https://www.archerx.com.au>.

Certain statistical and other information included in this presentation is sourced from publicly available third party sources and has not been independently verified.

A person wearing a blue cleanroom suit and a hairnet is seated at a workstation in a cleanroom. They are looking at two computer monitors. The left monitor displays a software interface with various data fields and graphs. The right monitor shows a CAD model of a mechanical part. In the background, there are various pieces of equipment, including a laser displacement meter and a power supply unit. The overall environment is a high-tech laboratory or manufacturing facility.

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

/ Company Overview

Archer is a technology company that is developing advanced semiconductor devices, including chips relevant to quantum computing and medical diagnostics. Archer is long-term value driven and creates maximum value by[†]:

- + Progressing its technology development, including its ¹²CQ quantum computing processor chip (“¹²CQ chip”) and graphene-based biosensor chip (“biochip”).
- + Utilising Tier 1 tech development infrastructure and facilities, R&D, people and IP, to support pre-market development.
- + Protecting key intellectual property assets (e.g. patents and patent applications) with global competitive advantages.
- + Applying a business model that values partnerships, as a key player[‡] in global networks coordinated by large companies.



[†] <https://www.bcg.com/en-au/publications/2019/dawn-deep-tech-ecosystem>

[‡] <https://www.nature.com/articles/s42254-020-00247-5>; also <https://www.ibm.com/quantum-computing/network/members/>

On-chip components of a qubit control device, with features ten times smaller than the width of a human hair.

/ Experienced Board and Management



Executive Chairman
Greg English
LLB, BE (Mining)



Non-Executive Director
Alice McCleary
DUniv, BEc FCA FTIA FAICD



Non-Executive Director
Kenneth Williams
BEc (Hons), M APP FIN, FAIC



Non-Executive Director
Bernadette Harkin
MBA, GAICD



Chief Executive Officer
Mohammad Choucair
PhD, FRACI FRSN GAICD



**Chief Financial Officer &
Company Secretary**
Damien Connor
CA GAICD AGIA B.Com



† Alice McCleary to retire at Company 2021 AGM.



Ticker

AXE

Australian Securities Exchange listing

Sector

Semiconductors

Market Capitalisation

A\$362m

As of 25 Oct 2021

Peers

**Intel, AMD, IonQ
Rigetti, NVIDIA**

Chosen by similar industry, tech, or activity

Cash at Bank

A\$29.4m

No corporate debt. As of 21 Oct 2021

Share Price

A\$1.515

As of 25 Oct 2021

Key Activities

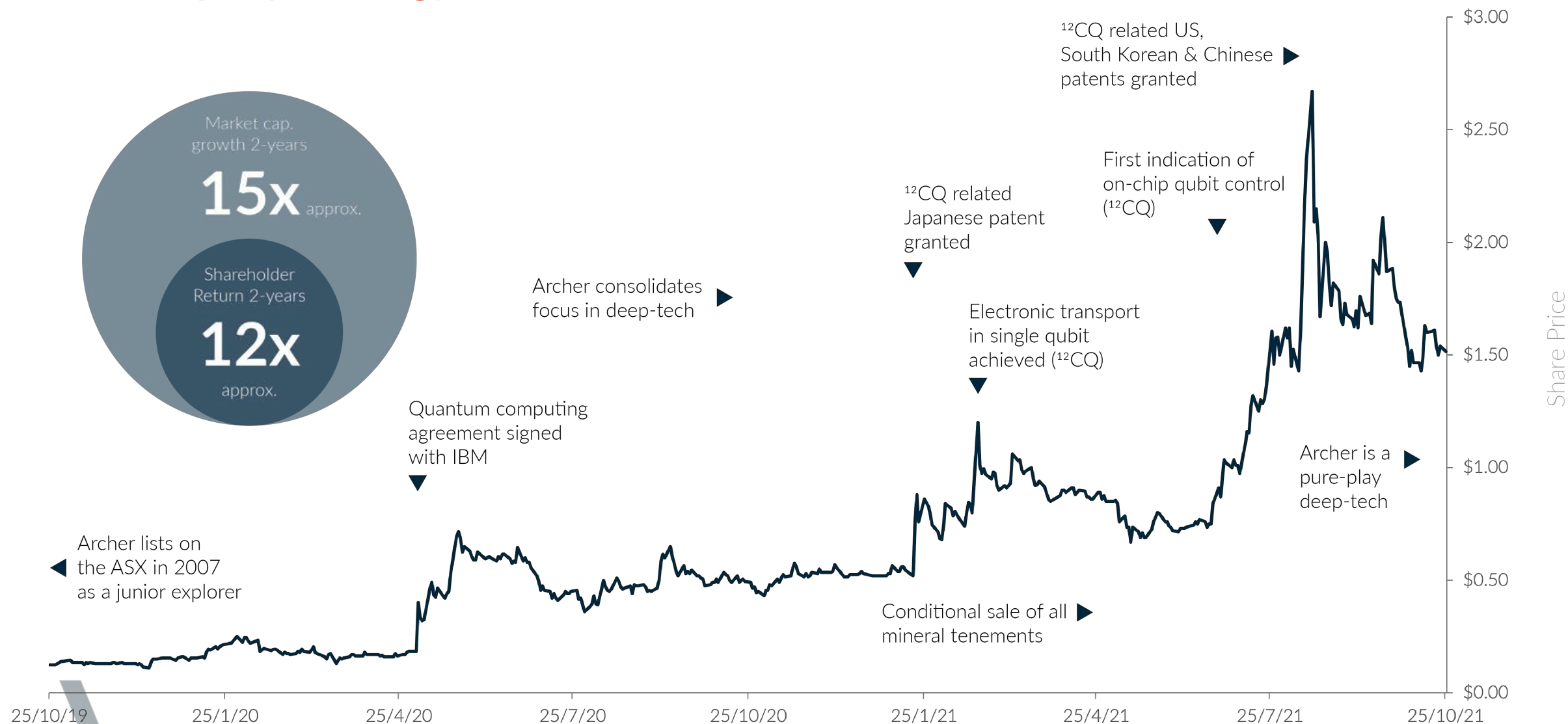
**Quantum computing, deep tech,
semiconductor devices, chips**

Shareholder Return

+206%

12 months as of 25 Oct 2021

/ Company Strategy in Action



As of 25 October 2021.

A person wearing a blue cleanroom suit, hood, and gloves is working on a piece of semiconductor manufacturing equipment. The person is leaning over a work area, and their hands are visible near the equipment. The background shows a cleanroom environment with various pieces of machinery and equipment.

ARCHER IS DEVELOPING ADVANCED SEMICONDUCTOR DEVICES

/ Semiconductor Industry

Archer is a technology company that operates within the semiconductor industry:

- + The Office of the NSW Chief Scientist & Engineer[†] presents a positive long-term outlook for the potential of increased participation by companies such as Archer in the global semiconductor sector.
- + The largest areas of opportunity for the scaleup of companies such as Archer in the global semiconductor industry, includes enhancing domestic capability in semiconductor design, fabrication, and prototyping.
- + According to KPMG*, the top issues facing the semiconductor industry over the next three years include supply chain disruption, talent risk, and cross border regulations.

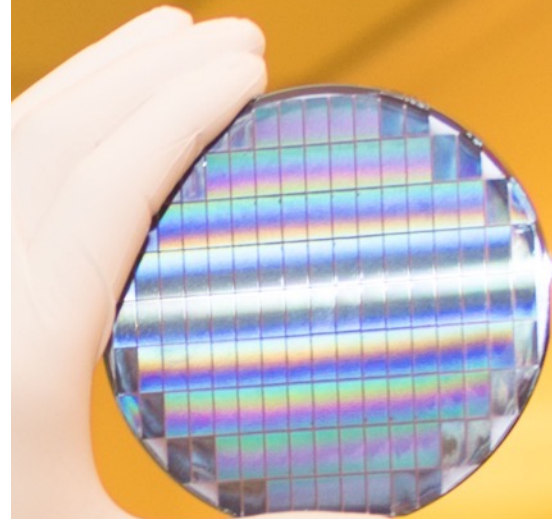
[†] <https://www.chiefscientist.nsw.gov.au/independent-reports/australian-semiconductor-sector-study>
Further Insights: <https://www.mckinsey.com/industries/semiconductors/our-insights>
Also; *<https://advisory.kpmg.us/articles/2021/global-semiconductor-industry-outlook-2021.html>

Products representing growth opportunity for the semiconductor industry over the next year

(Averages on a 1 to 5 scale with 1=Low growth opportunity and 5=High growth opportunity.)

	2021 Outlook	2020 Outlook
Sensors/MEMS	3.8	3.7
Analog/RF/Mixed Signal	3.7	3.5
Microprocessors (GPU/MCU/MPU)	3.6	3.2
Optoelectronics	3.3	3.1
Memory (Flash, DRAM)	3.3	3.0
Other Logic	3.0	2.8
Discretes	2.9	2.6

**QUANTUM
COMPUTING IS
REVOLUTIONARY
DEEP-TECH**



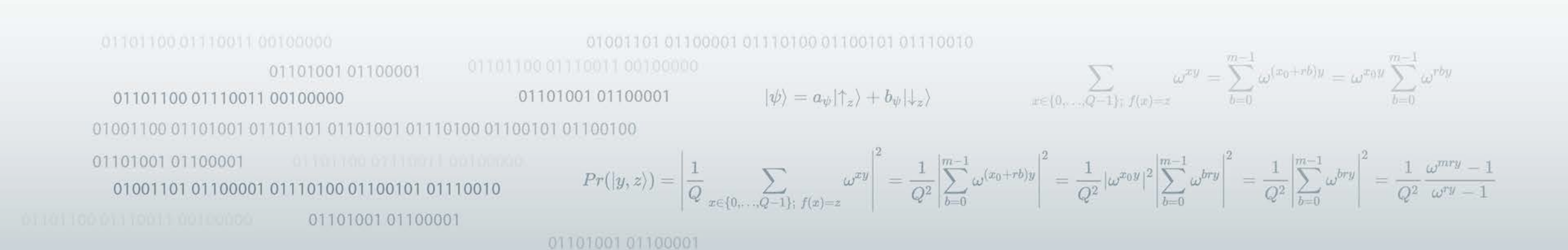
/ Quantum Computing vs. Classical Computing

$|\psi\rangle$ **Quantum computing qubit**
is a new way to represent information using quantum states in different materials and light

$|\phi\rangle$ **Qubit materials**
are the physical basis of quantum computing tech e.g. silicon, superconductors, diamond and carbon, etc.

$|\downarrow_x\rangle$ **Qubit processor unit (QPU)**
is the most crucial hardware device of a quantum computer, and is an entirely new type of processor technology

$|\uparrow_x\rangle$ **Quantum computing**
represents the next generation of powerful computing & is under development, with limited ownership & use



00 Classical bit
is processable information in a binary 0 or 1 state as a static, electronic signal

01 Semiconductor materials
are the basis of modern tech and used to make transistors & capacitors

10 Central processing unit (CPU)
is the device inside phones & PCs responsible for performance and function i.e processor chip

11 Modern computing
in phones, tablets, & PCs is converging, needing more powerful 'PUs' e.g. functionality



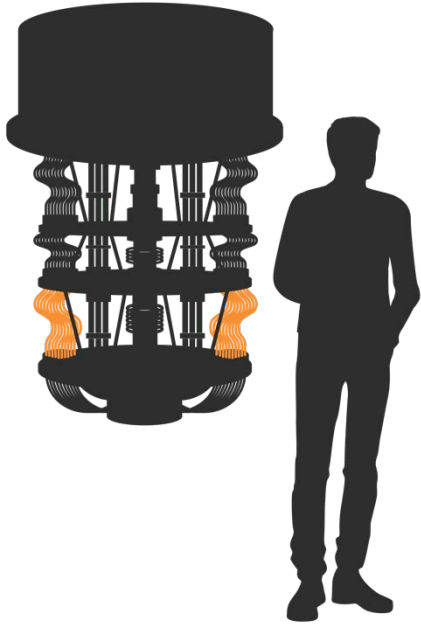
/ Unique Technological Advantage

Archer is in the developmental stage of building an operational quantum computing qubit processor chip (^{12}CQ chip):

- + Using a qubit material with the proven potential to enable chip operation at room-temperature *and* integration onboard electronic devices[†].
- + The ^{12}CQ chip would potentially allow for practicality and miniaturisation of a quantum computing processor device onboard mobile devices for faster and increased power in AI, Big Data, and Fintech applications.
- + ^{12}CQ qubit advantageous to other qubit systems, which require low temperatures, high/low pressures, well-defined crystals, atomic manipulation, photonics, lasers, or metals to currently operate and scale.

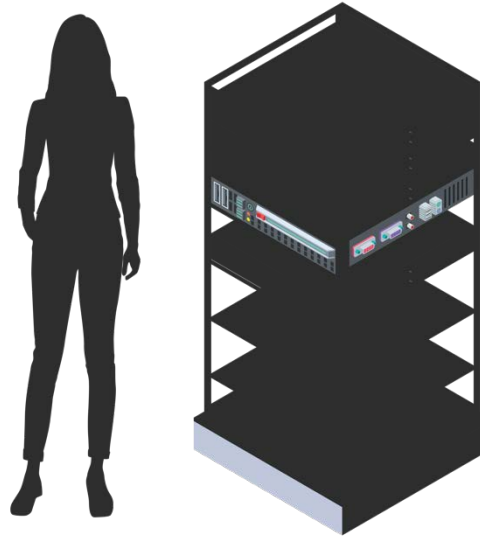
[†] <https://www.nature.com/articles/ncomms12232>

/ Accessibility and Use in Quantum Computing



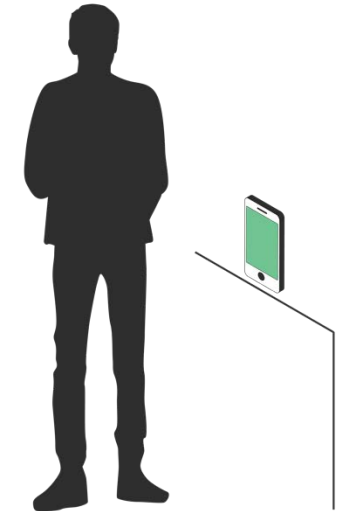
Cloud-based

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



Edge and/or Cloud-based

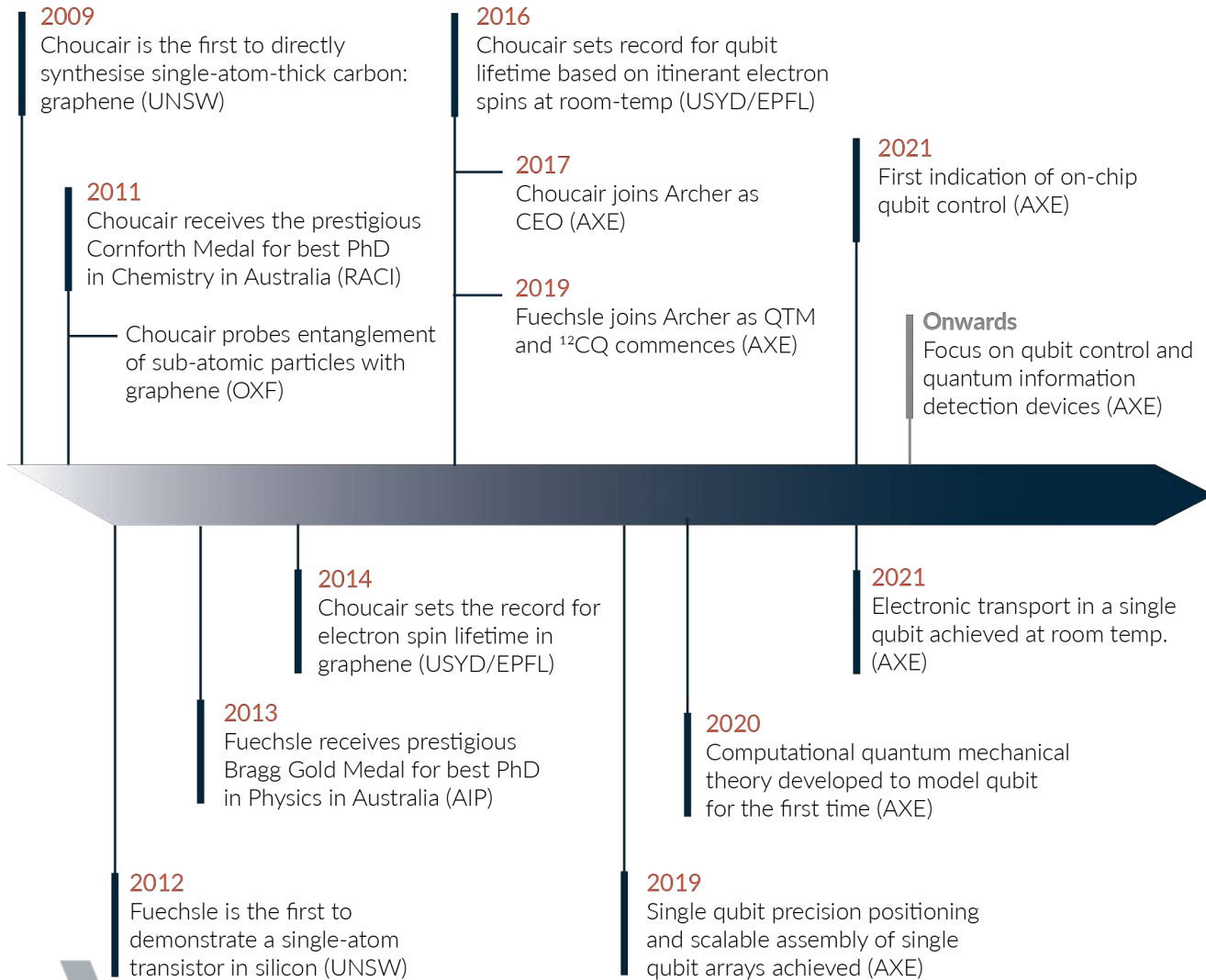
- + Operate at room temperature but are difficult to integrate into modern devices. Installed on-site.
e.g. Photonic, ion-traps, diamond.



Quantum Powered Mobile Devices

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

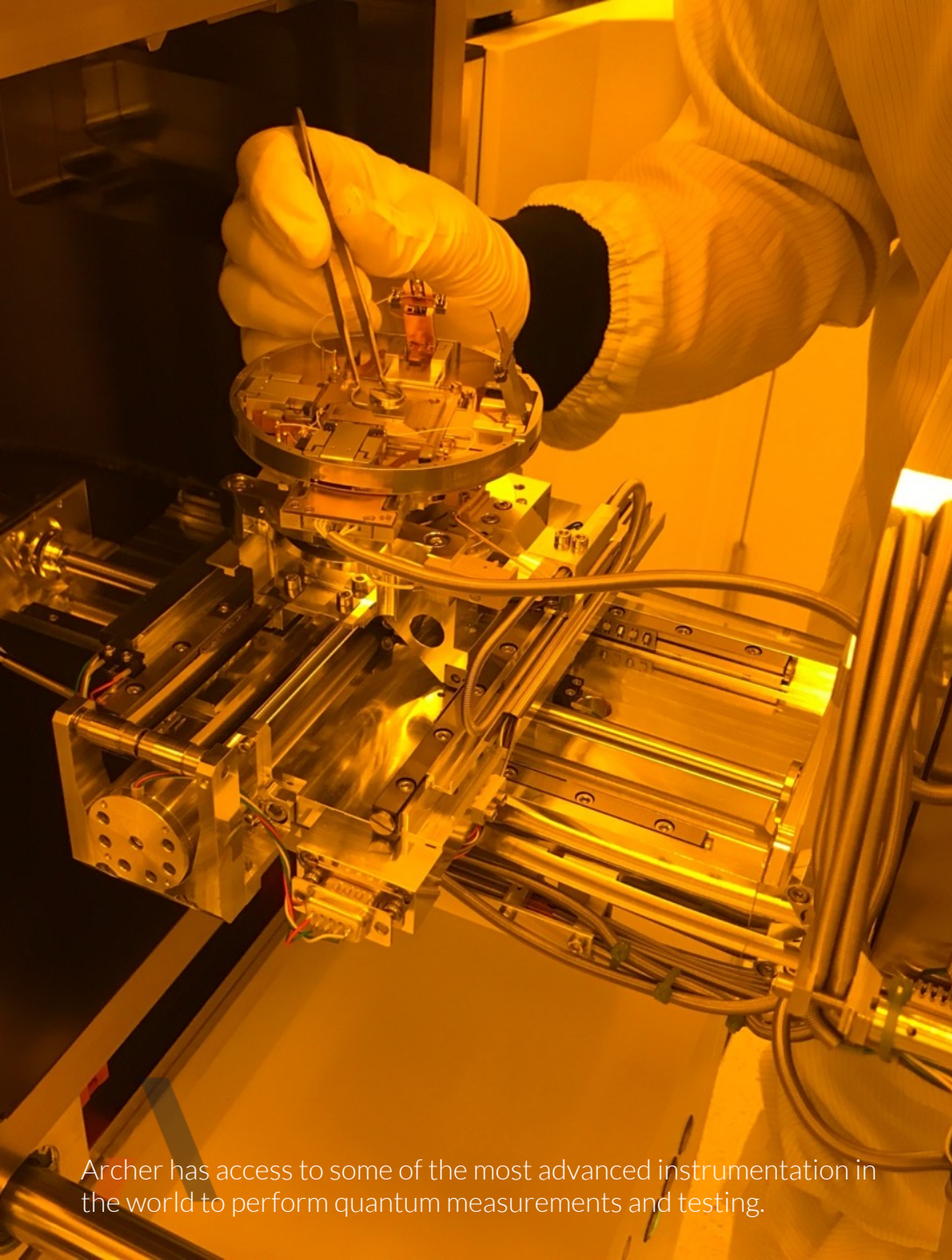
/ Record Setting Innovation



† 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>

NCRIS
National Research
Infrastructure for Australia
An Australian Government Initiative

Archer has access to institutional deep tech infrastructure across Australia to build and test its quantum materials and devices.



Archer has access to some of the most advanced instrumentation in the world to perform quantum measurements and testing.

/ Era of Quantum Computing

According to BCG[†] and Goldman Sachs[‡], value for investors in the quantum computing economy is expected to increase rapidly as quantum hardware is developed:

- + 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 and semiconductors including quantum computing**.
- + The International Roadmap for Devices and Systems lists Quantum Computing a key tech in the 'post-Moore' era[‡].

[†] <https://www.bcg.com/en-au/publications/2019/quantum-computers-create-value-when.aspx>

[‡] <http://www.goldmansachs.com/our-thinking/pages/toshiya-hari-quantum-computing.html>

[§] <https://www.csiro.au/en/Showcase/quantum/>

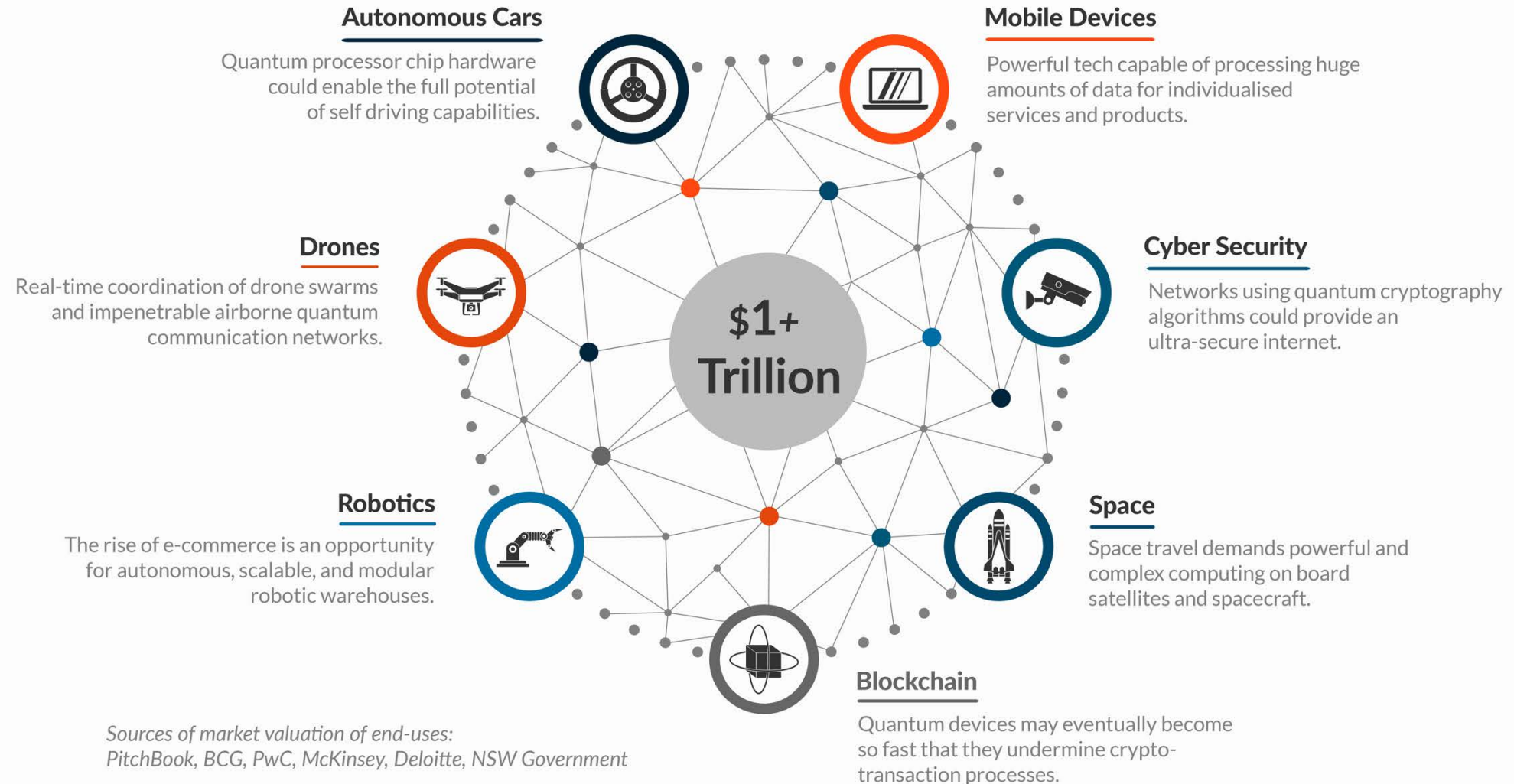
* <https://www.congress.gov/bill/115th-congress/house-bill/6227>

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

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

The Future of Technology

We expect Archer's quantum chip technology to create entirely new quantum computing powered mobile devices that enable industry-wide innovation.

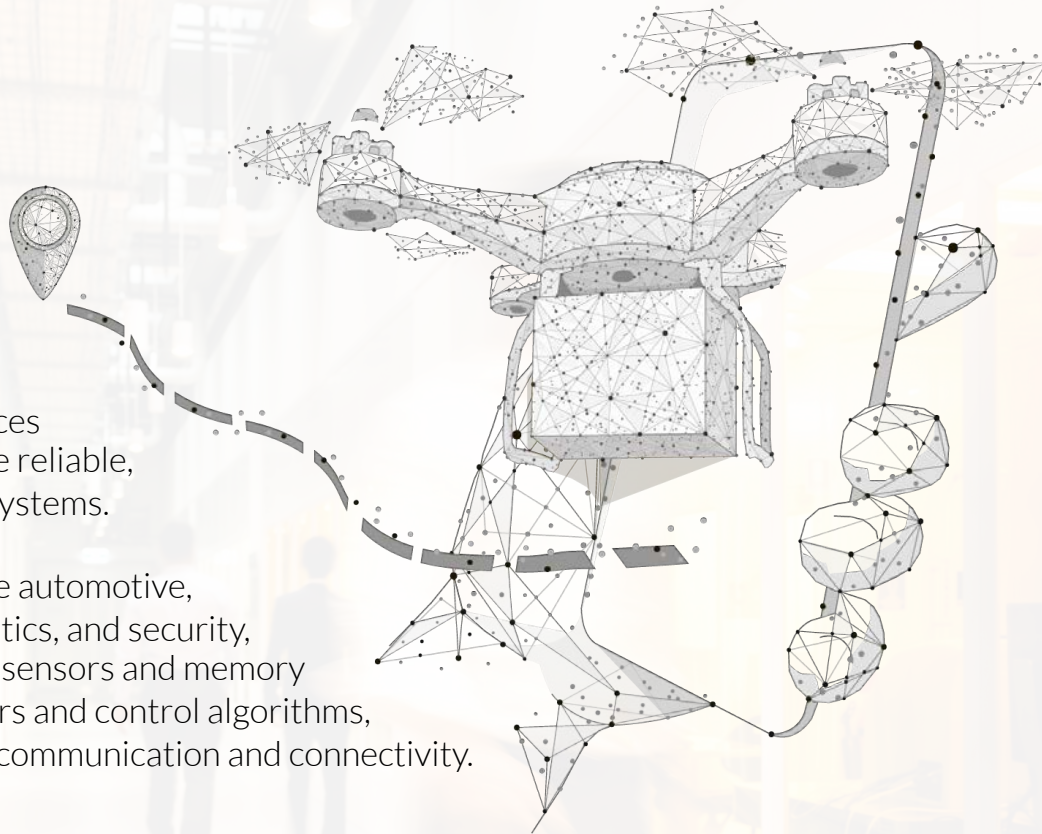


Mobile-centric quantum powered applications

Autonomous Technology

Over the next decade, quantum powered devices could enable safer, more reliable, and truly autonomous systems.

Mobile end-uses include automotive, maritime, aviation, robotics, and security, requiring integration of sensors and memory with quantum processors and control algorithms, embedded with secure communication and connectivity.



Application Areas

Finance

24

Nature

111

Machine Learning

32

Optimisation

28

Number of publications from members of the IBM Quantum Network as of April 2021. Nature includes the fields of physics and chemistry.

Quantum Computing Collaborations

**IBM Q
Network**

Archer is a member of the IBM Quantum Network and the associated Quantum Startup Program.

The background of the slide features a close-up photograph of industrial machinery, possibly a pump or valve assembly, with various metal pipes, fittings, and a black hose. The scene is bathed in a warm, yellow light, creating a high-contrast, industrial aesthetic. The machinery is partially obscured by a large white rectangular area that contains the main text.


ARCHER'S TECHNOLOGY DEVELOPMENT IS LED BY PIONEERING INNOVATORS

/ Innovation and Leadership

The Archer team works with nanotechnologists, physicists, chemists, semiconductor foundry engineers, and quantum algorithm developers from around the world. Archer's ^{12}CQ chip development is led by:

Dr Mohammad Choucair *FRACI FRSN GAICD*. Archer CEO since Dec 2017. PhD in Chemistry (UNSW). Alumni of AGSM UNSW Business School. Former World Economic Forum Global Councillor. Inventor of the ^{12}CQ quantum computing technology. RACI Cornforth Medallist for the most outstanding Chemistry PhD in Australia. Honorary Fellow of the University of Sydney.

Dr Martin Fuechsle *MRSN*. Archer Quantum Technology Manager since Feb 2019. PhD in Physics (UNSW). Over 10 years experience in building quantum computing devices and technology. AIP Bragg Gold Medallist for the most outstanding Physics PhD in Australia. Inventor of the single-atom transistor. Honorary Associate of the University of Sydney.

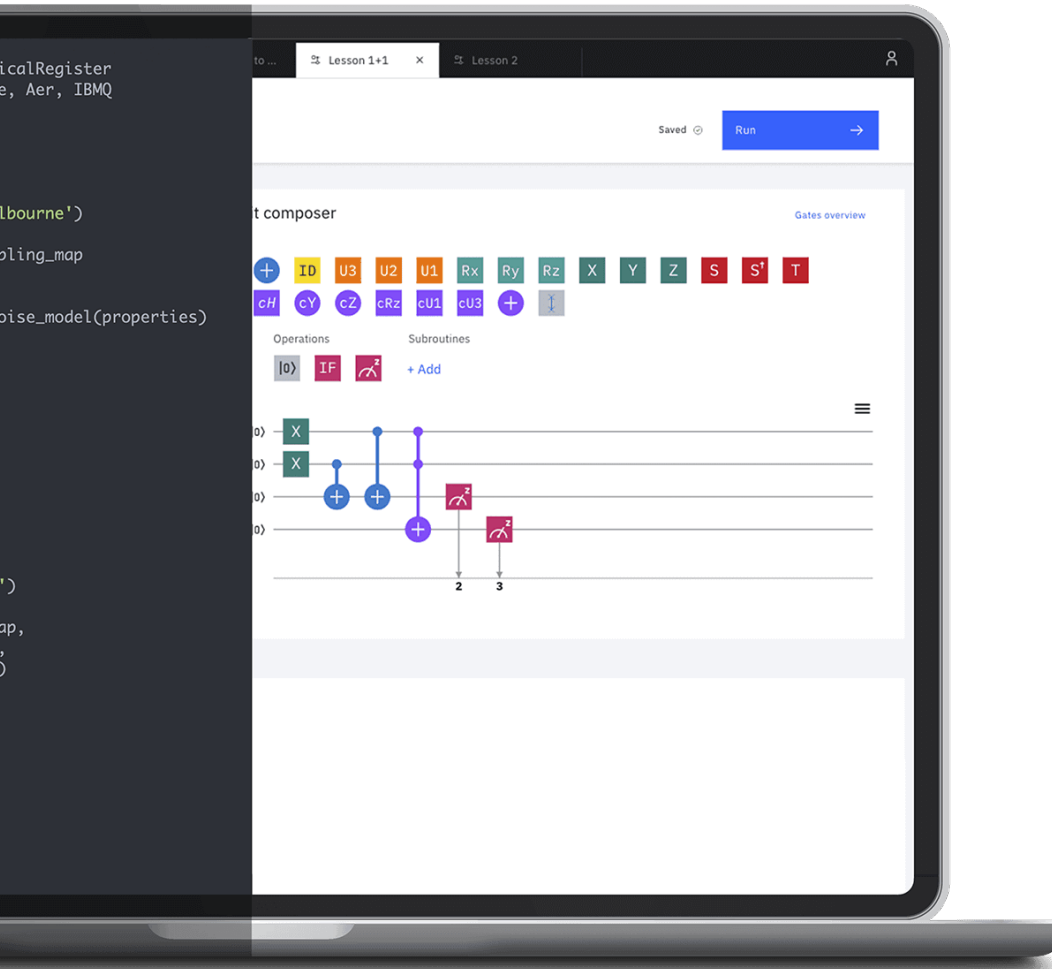
A photograph of two men, Dr. Mohammad Choucair and Dr. Martin Fuechsle, standing in front of a brick building. Dr. Choucair is on the left, wearing a dark blue suit and a striped tie. Dr. Fuechsle is on the right, wearing a dark grey suit and a solid red tie. They are both looking towards the camera.

Dr Mohammad Choucair (left) and Dr Martin Fuechsle (right).

/ 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.



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

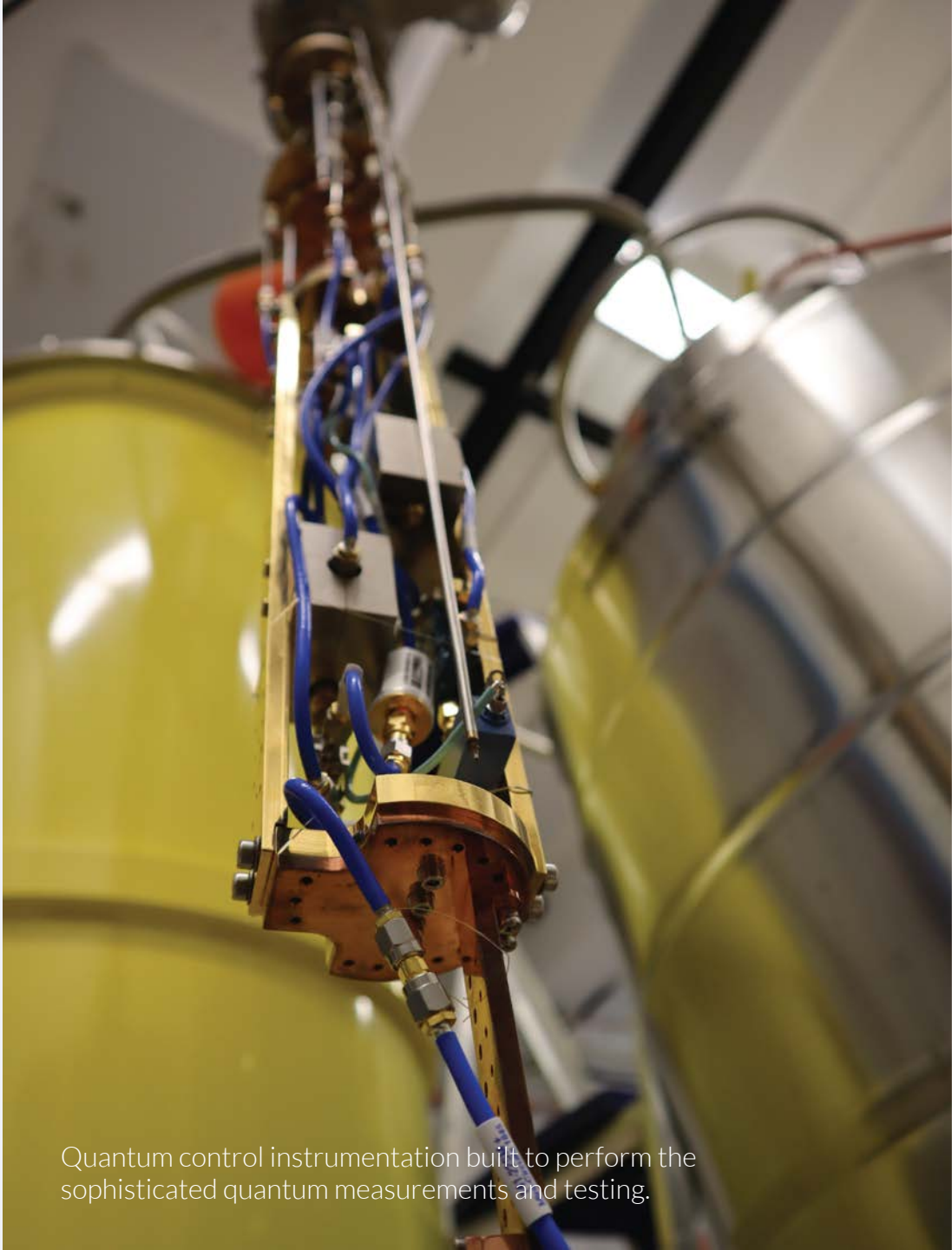
[†]ASX announcement 4 May 2021.



**WELL PROTECTED IP IS
CHARACTERISTIC OF
DEEP TECHNOLOGY**

Exhibit 2. Description of Archer’s technology patents and patent applications

Priority Date	Technology Summary																				
3 Dec 2015	<div><div></div><div>A quantum electronic device. Quantum electronic devices for processing qubits represented by an electron spin on a new type of carbon nanomaterial and methods for using this material in quantum computing.</div></div> <table><tr><th>Stage & Coverage</th><th>Patent/Application Number</th></tr><tr><td colspan="2">Granted</td></tr><tr><td>Japan</td><td>6809670</td></tr><tr><td>South Korea</td><td>10-2288974</td></tr><tr><td>China</td><td>4606612</td></tr><tr><td>United States of America</td><td>11126925</td></tr><tr><td colspan="2">Pending</td></tr><tr><td>Australia</td><td>2016363118</td></tr><tr><td>Hong Kong</td><td>18115770.4</td></tr><tr><td>Europe</td><td>3383792</td></tr></table>	Stage & Coverage	Patent/Application Number	Granted		Japan	6809670	South Korea	10-2288974	China	4606612	United States of America	11126925	Pending		Australia	2016363118	Hong Kong	18115770.4	Europe	3383792
Stage & Coverage	Patent/Application Number																				
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Japan	6809670																				
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China	4606612																				
United States of America	11126925																				
Pending																					
Australia	2016363118																				
Hong Kong	18115770.4																				
Europe	3383792																				
15 Feb 2019	<div><div></div><div>Graphene complexes and compositions thereof. Complexes comprising graphene compositions, methods of synthesising these complexes and compositions, and the use of these complexes and compositions in biomolecular sensing.</div></div> <table><tr><th>Stage & Coverage</th><th>Patent/Application Number</th></tr><tr><td colspan="2">Pending</td></tr><tr><td>Australia</td><td>2020220236</td></tr><tr><td>United States of America</td><td>17429442</td></tr></table>	Stage & Coverage	Patent/Application Number	Pending		Australia	2020220236	United States of America	17429442												
Stage & Coverage	Patent/Application Number																				
Pending																					
Australia	2020220236																				
United States of America	17429442																				



Quantum control instrumentation built to perform the sophisticated quantum measurements and testing.



LAB-ON-A-CHIP TECH: A PARADIGM SHIFT IN MEDICAL DIAGNOSTICS

/ Lab-on-a-Chip Diagnostics



Performance

Linked to materials' optical, electrical, magnetic, and/or chemical properties



Graphene Biosensors

Could provide rapid, highly sensitive and low-cost testing for IVDs



Limited Materials

Few materials available to directly read out molecular-level based bioactivity



Ultrasensitivity

Graphene is electronically active & biocompatible, disrupting non-portable optical IVDs



Biochip Design

Subset of Sensors/MEMS chip devices functioning in biological settings



Miniaturisation

Scaling single or multiple lab processes down to mm-size chip-formats



Integration

Several lab functions on a single chip, while eliminating some functions



Platform Technology

Digitising simultaneous biochemical reactions to achieve automation & high throughput

*More information on Australian regulations related to In-vitro Diagnostics (IVDs): <https://www.tga.gov.au/medical-devices-ivds>
Learn more about Lab-on-a-Chip technology developments: <https://www.rsc.org/journals-books-databases/about-journals/lab-on-a-chip/>

/ Developing Archer's Biochip

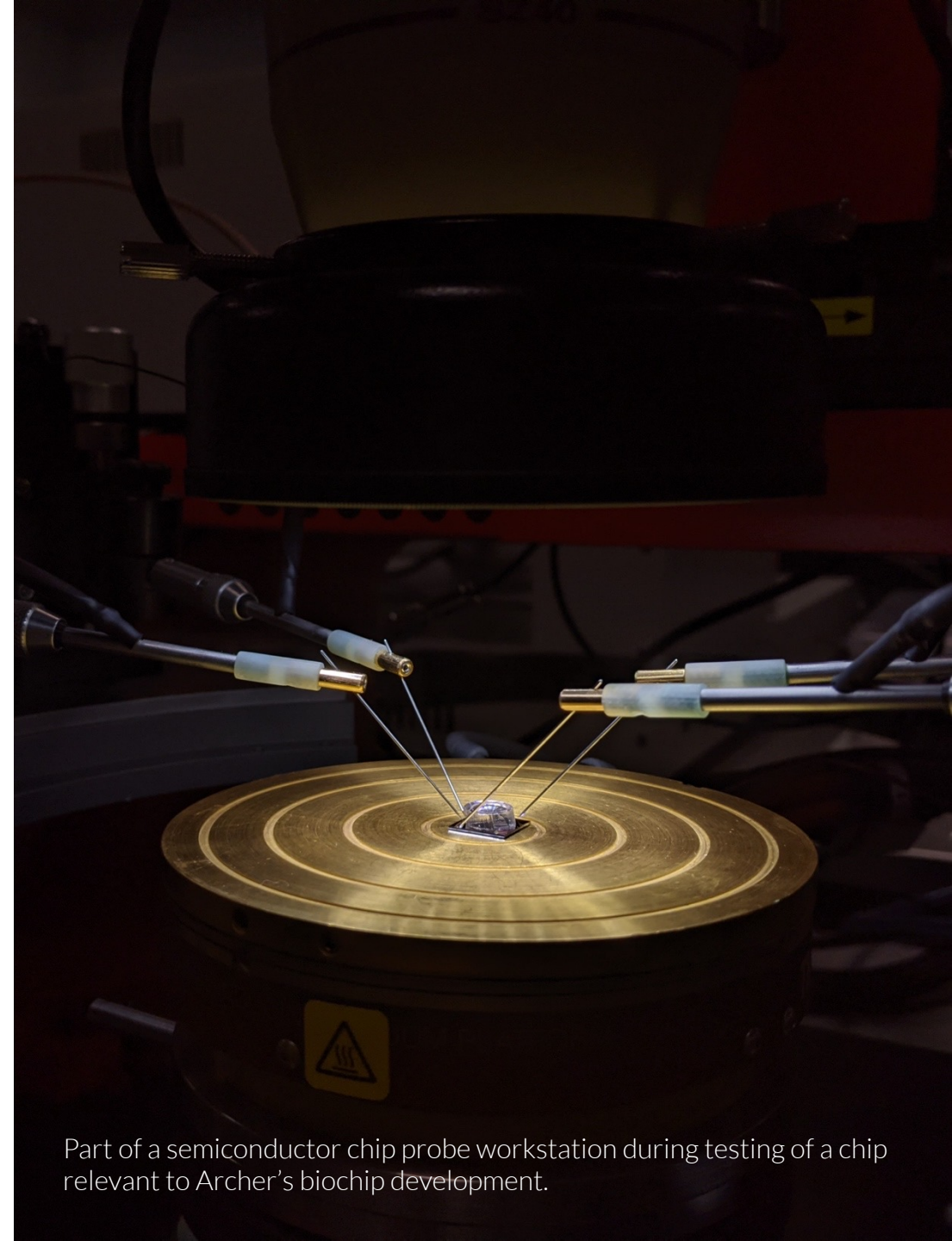
Archer's biochip is in early-stage development and its design principles involve using proprietary graphene materials in integrated circuits, to form key biosensing elements:

- + Archer continues to strategically secure access to local institutional deep-tech infrastructure to grow its capability in semiconductor prototyping production.
- + The Company is working towards developing foundry fabricated graphene transistors using 100% owned IP, at the limits of what can be achieved technologically[‡].
- + During his PhD at UNSW Sydney, Archer CEO, Dr Mohammad Choucair, was the first in the world to directly synthesise graphene in bulk-scale quantities; and not use graphite[†].



[‡] International Patent Application No. PCT/AU2020/050128

[†] <https://www.nature.com/articles/nnano.2008.365>

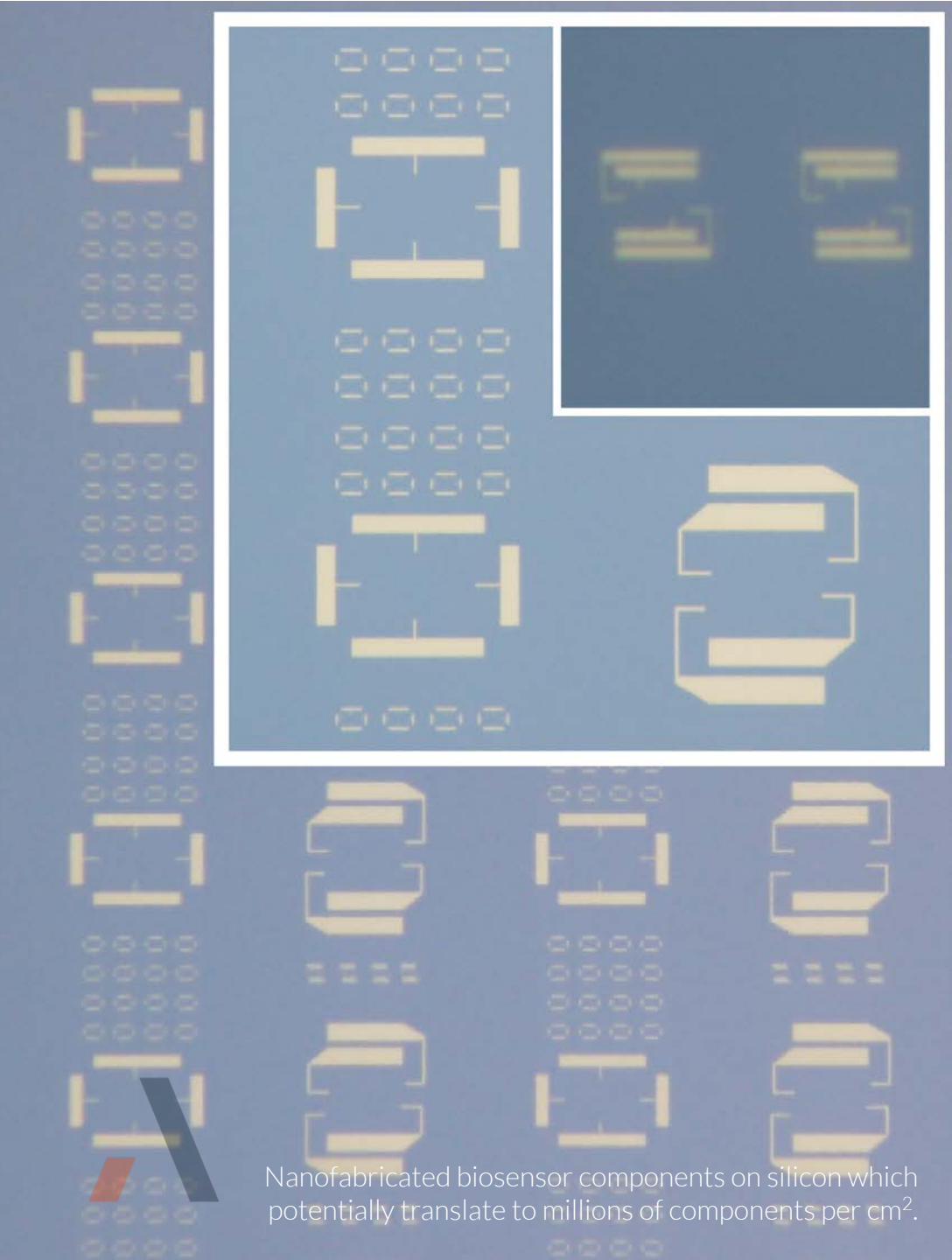


Part of a semiconductor chip probe workstation during testing of a chip relevant to Archer's biochip development.

/ Two-dimensional Miniaturisation

Archer has made rapid progress over the past 12 months and is now able to miniaturise its biosensing components to chip-formats, overcoming a key barrier to entry in lab-on-a-chip device development:

- + Successfully demonstrated fabrication of biosensor components of ca. 100 nm features on silicon wafers*, which could enable high volume chip production.
- + Company has used and expanded in-house capability to miniaturise key biosensor components from 1 sensor component per cm^2 to potentially 1 million+ sensor components per cm^2 .
- + Archer's team includes cross-functional expertise in semiconductor device fabrication, nanotech, advanced materials engineering, and molecular biology, to grow a world-class IP portfolio.



Nanofabricated biosensor components on silicon which potentially translate to millions of components per cm^2 .

* The Company is currently working towards achieving best-in-class sub-10 nm feature sizes. ASX announcement 8 April 2021.

ASX Code: AXE

ACN: 123 993 233

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

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LinkedIn: <https://www.linkedin.com/company/archerxau>

YouTube: <https://bit.ly/2UKBBmG>

Sign up to our Newsletter: <http://eepurl.com/dKosXl>

