Archer Materials Limited (ACN: 123 993 233)
Ground Floor, 28 Greenhill Road, SA 5034

ASX Announcement (ASX:**AXE**) 21 April 2020

Quantum computing Q&A webinar

Archer Materials Limited ("Archer", the "Company") (ASX:**AXE**) recently provided an opportunity for shareholders and investors to submit questions they had about 'all things quantum computing' to the Company to be answered by Archer's in-house quantum technology expert, Dr Martin Fuechsle.

The Q&A was an outstanding success with over 55 questions submitted. The Company collated, moderated, and themed the questions, and Dr Martin Fuechsle pre-recorded a webinar to address the questions asked, which can be found here.

The webinar covers areas in quantum computing that currently generate the most economic value, including what the current technology barriers to adoption are, applications of quantum computing, the importance of intellectual property assets in the quantum economy, and how Archer's ^{12}CQ chip technology has the potential to overcome barriers to widescale quantum computing adoption to make global impact.

A copy of the webinar presentation is included with this announcement below. The Company would like to thank shareholders and investors for their participation and the excellent quality and broad scope of questions asked.

About Archer

A materials technology company developing materials in quantum computing, biotechnology, and lithium-ion batteries, and exploring for minerals in Australia. The Company has strong intellectual property, broad-scope mineral tenements, world-class in-house expertise, a diverse advanced materials inventory, and access to over $300 million of R&D infrastructure.

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

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Chief Executive Officer

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

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Twitter:
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/ Company Webinar

ARCHER

Quantum Technology: ^{12}CQ
Q&A April 2020

/ Disclaimer

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This presentation contains information which was reported in ASX announcements lodged between 1 October 2017 and 20 April 2020 (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.

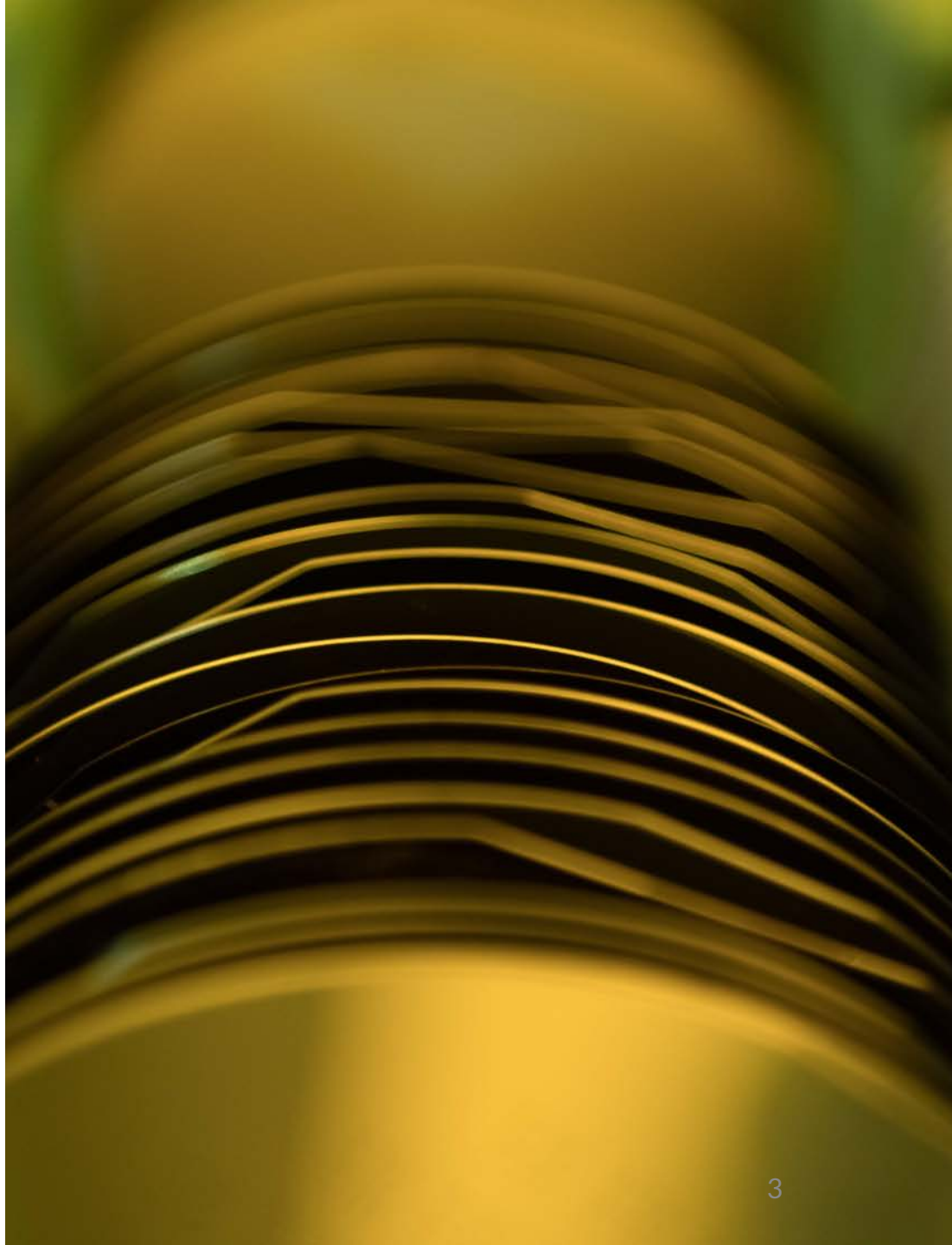
Certain statistical and other information included in this presentation is sourced from publicly available third party sources and has not been independently verified.

/ Webinar Agenda

Archer is one of a few companies globally that provides investors a direct, on-market opportunity to invest in quantum computing technology.

The multi-billion dollar quantum computing economy is rapidly growing, complex, and has the potential to impact all sectors dependent on computational power. This presentation is focused on the following areas:

+ How Archer's ^{12}CQ chip technology is a potential solution to the widescale adoption of quantum computing;
+ How applications of quantum computing could make a positive financial impact to businesses and consumers;
+ How shareholder value may be maximised from technology development in quantum computing;
+ How intellectual property can be used to secure long-term competitive advantages to generate revenue.



/ Company Snapshot

Archer Materials Limited
ASX: AXE

/ Capital Structure & Overview

$2.7m
Cash in bank as of 31 Dec 2019

212.4m
Number of ordinary shares on issue

$0.16
Share price (20 Apr 2020)

$34.0m
Market capitalisation (20 Apr 2020)

116%
1-year return (20 Apr 2020)

27%
Of issued shares held by top 20 shareholders

+ No corporate debt (as of 20 Apr 2020).

/ Quantum Technology Management

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

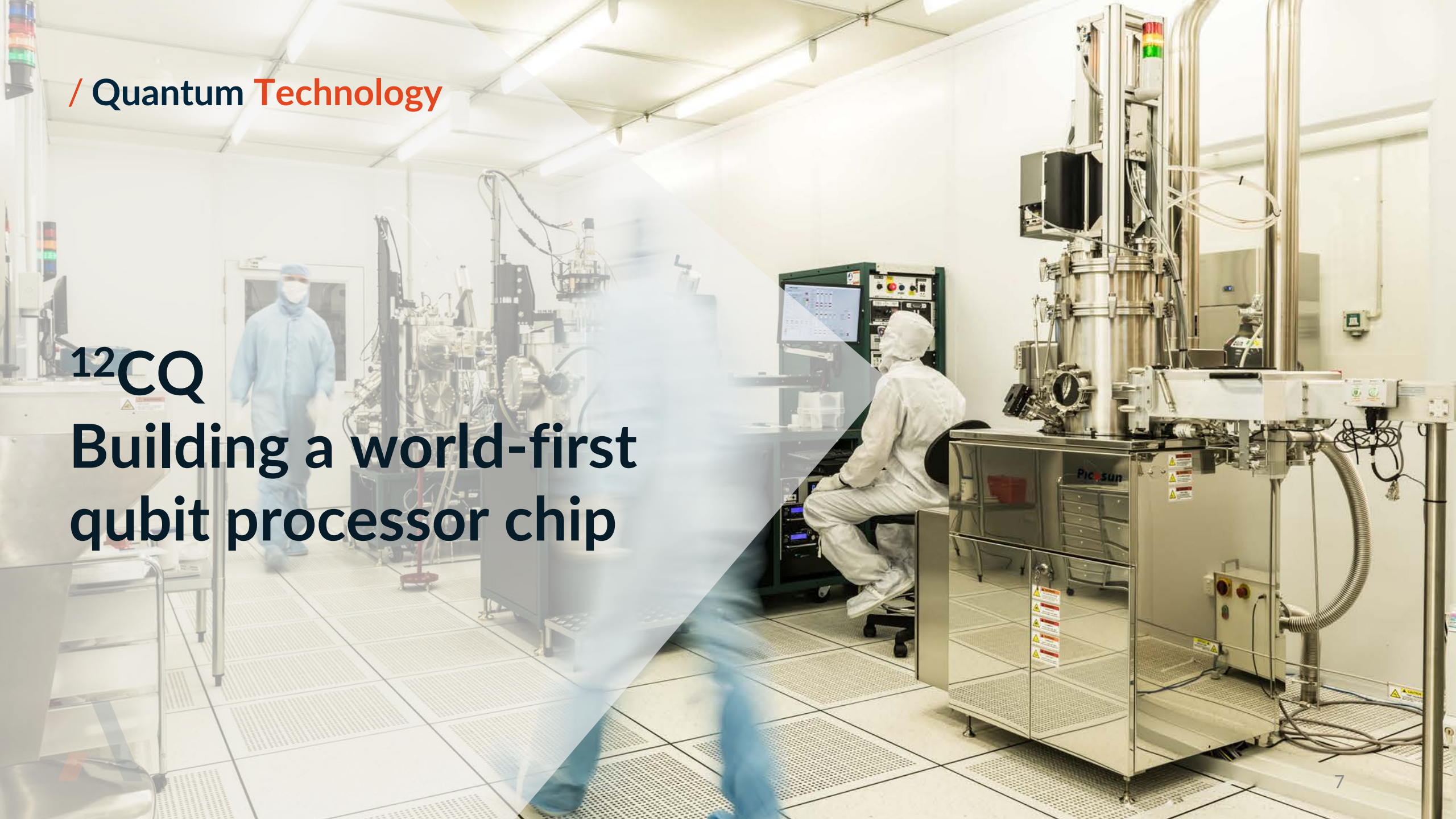
Dr Martin Fuechsle. Archer Quantum Technology Manager since Feb 2019. PhD in Physics (UNSW). 10 years experience in building quantum computing devices and technology. AIP Bragg Gold Medallist for the most outstanding Physics PhD in Australia. Inventor of the single-atom transistor. Honorary Associate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

*See Appendix for list and biographies of Archer's Board of Directors.

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

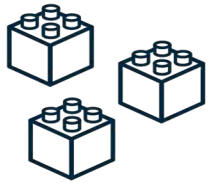
/ Quantum Technology

^{12}CQ
Building a world-first qubit processor chip



/ Classical Computing vs. Quantum Computing

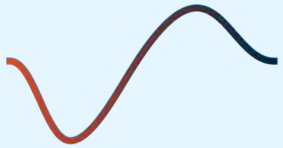
'Classical Bit'
Processable information in a binary 0 or 1 state
e.g. electronic signal
Static



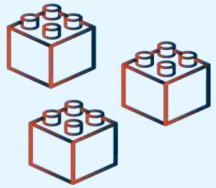
Semiconductor Materials
Key to transistor development & the basis of modern technology
e.g. silicon
Atomic Limits

Central Processing Unit (CPU)
Critical device inside computing devices & responsible for performance and function
Moore's Law

Modern Computers
As smartphones, tablets, and PCs converge they require increasingly powerful CPUs and components
Technology Function



'Qubit'
Processable information in a quantum 'superposition' state
e.g. electron spin, light
Lifetimes & Control



'Qubit' Materials / Qubits
The tangible physical basis of quantum computing technology
e.g. superconductors, silicon
Temperature & Stability

'Qubit' Processor Unit (QPU)
The most crucial hardware device component, and 'brain' of the quantum computer
Integration & Fabrication

Quantum Computers
Represent incredibly powerful parrallel computing & currently in development
Impractical & Limited Ownership

/ ^{12}CQ: A Quantum Leap

Archer is well positioned to successfully build and commercialise an operational qubit processor as a potential solution to the widespread use of quantum computing, as:

+ Archer is using the only reported conducting qubit material capable of stable and robust quantum information processing at room-temperature: a key barrier to use for any future quantum computing powered consumer devices;

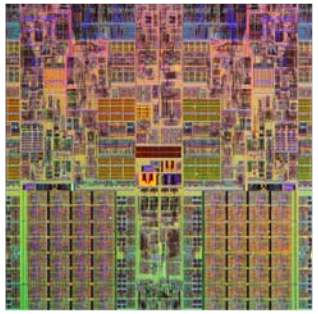
+ Successful companies in the computing economy are founded and led by highly skilled people with deep technical expertise competing against large organisations;

+ The computing industry over time has not consolidated, with growth reliant on smaller companies offering disruptive materials technology innovations like ^{12}CQ.

ƒ https://www.nature.com/articles/ncomms12232

Hallmarks of the computing industry.

ENIAC. Copyright Everett Historical Collection.



Die-shot of Intel Core i7 CPU. Copyright Intel Corp.

D-Wave system. Copyright D-Wave Systems Inc. (Media Resources)

1946. Electronic Numerical Integrator And Computer (ENIAC)

1947. Transistor demonstrated to replace the vacuum tube triode

1958. First ever integrated circuit built by Jack Kilby, using Ge and Al

1968. Intel founded by Gordon Moore **(PhD Chemistry)** and Robert Noyce **(PhD Physics)**

1975. Microsoft founded by Bill Gates and Paul Allen

1976. Apple Computer Company founded by Steve Jobs, Steve Wozniak and Ronald Wayne

1980s. The start of the personal computer (PC) era and home gaming consoles

1990s. The internet is invented and portable devices offer unprecedented connectivity

2010+. Quantum computing systems and prototype processor chips emerge

2019. Billions of transistor structures inside a CPU in mobile devices

Archer staff inspecting device instrumentation at the Research and Prototype Foundry, University of Sydney.

/ Quantum Computing Applications

Quantum computing has the potential to impact all industries dependent on computational power[†].

Qubit processors are being developed in order to implement 'quantum algorithms' that may address applications that classical computers find extremely difficult or impossible:

+ Applications that could greatly benefit from onboard qubit processors include: complex image processing, & securing financial transactions and decentralised ledgers;

+ General problem types: *combinatorial optimisation* (e.g. airline routes, portfolio optimisation), *differential equations* (e.g. medical device design, drug discovery), *linear algebra* (e.g. AI & machine learning), and *factorisation* (e.g. cryptography).

+ Quantum computing could provide greater information density over classical computers (e.g. molecular simulations).

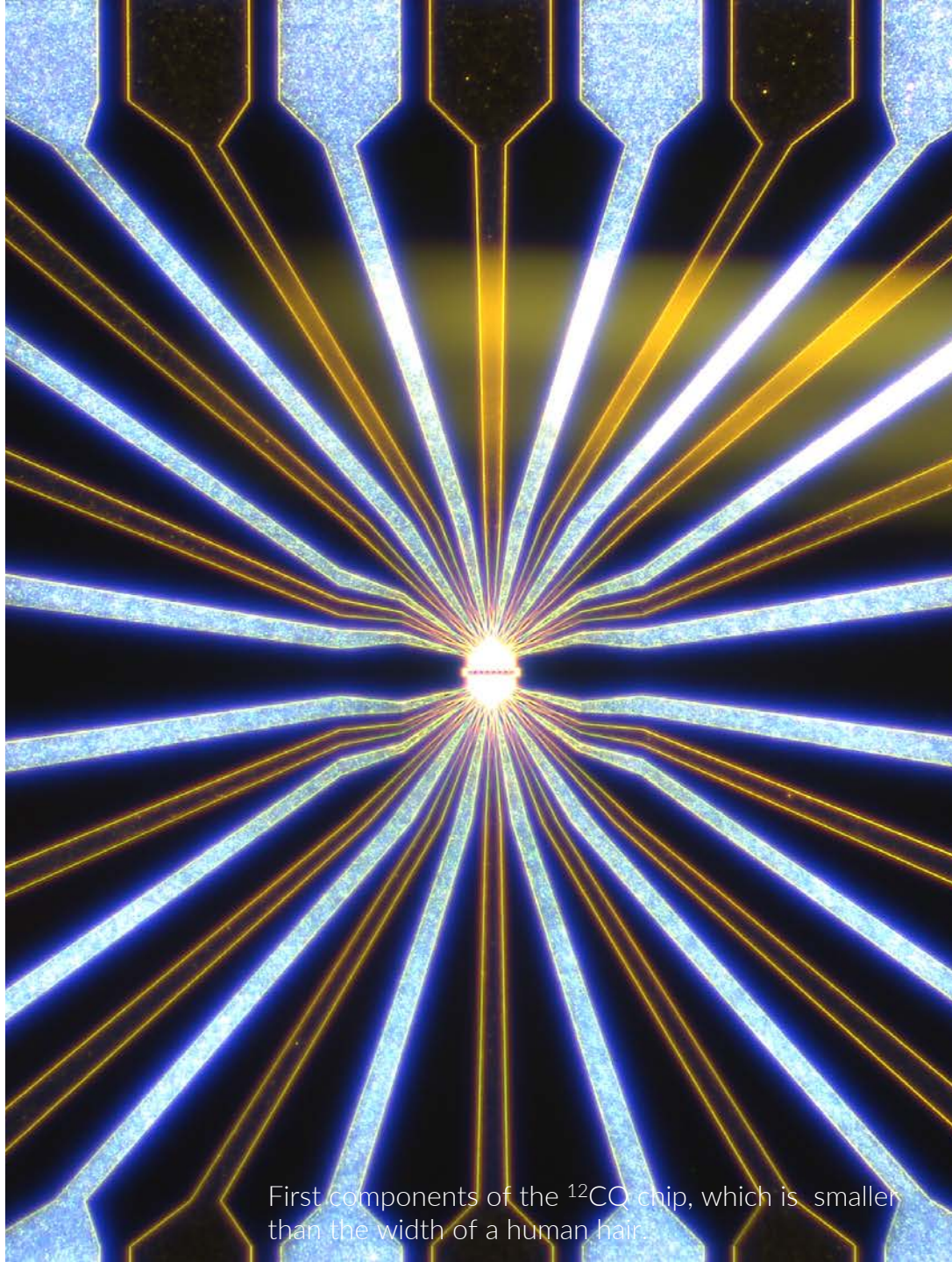
[†] https://www.bcg.com/en-au/publications/2018/next-decade-quantum-computing-how-play.aspx

/ Generating Value

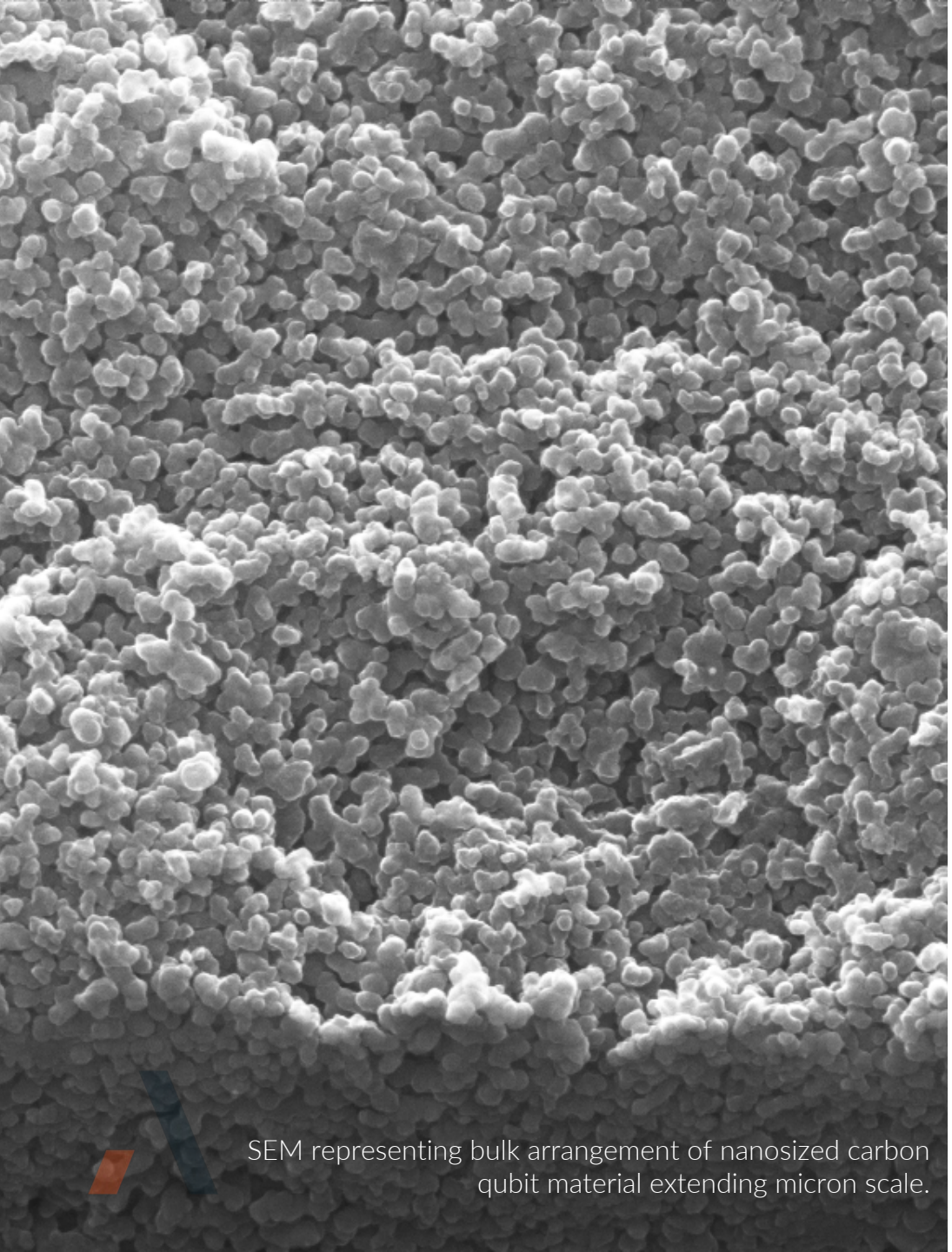
According the Boston Consulting Group†, McKinsey‡ and Goldman Sachs§, value for investors in quantum computing is expected to increase rapidly as quantum hardware and its commercial viability matures:

+ The quantum economy critically depends on hardware (e.g. qubit processors), of which there are few players;
+ Current qubit processor chips are in early-stage development & limited in algorithms that can be applied;
+ Early movers are in a better position to seize a large share of the total value generated, as laggards struggle with integration, talent, and IP;
+ Expected phases of quantum computing maturity include: *NISQ era* (2-5 years), *broad quantum advantage* (10+ years), *full-scale fault tolerance* (20+ years).

† 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
§ Appears in: https://www.economist.com/news/essays/21717782-quantum-technology-beginning-come-its-own



First components of the ^{12}CQ chip, which is smaller than the width of a human hair.



SEM representing bulk arrangement of nanosized carbon qubit material extending micron scale.

/ Carbon Qubit Material

Archer uses a unique carbon-based qubit material that has the potential to enable chip operation at room-temperature and integration onboard modern electronic devices[f]:

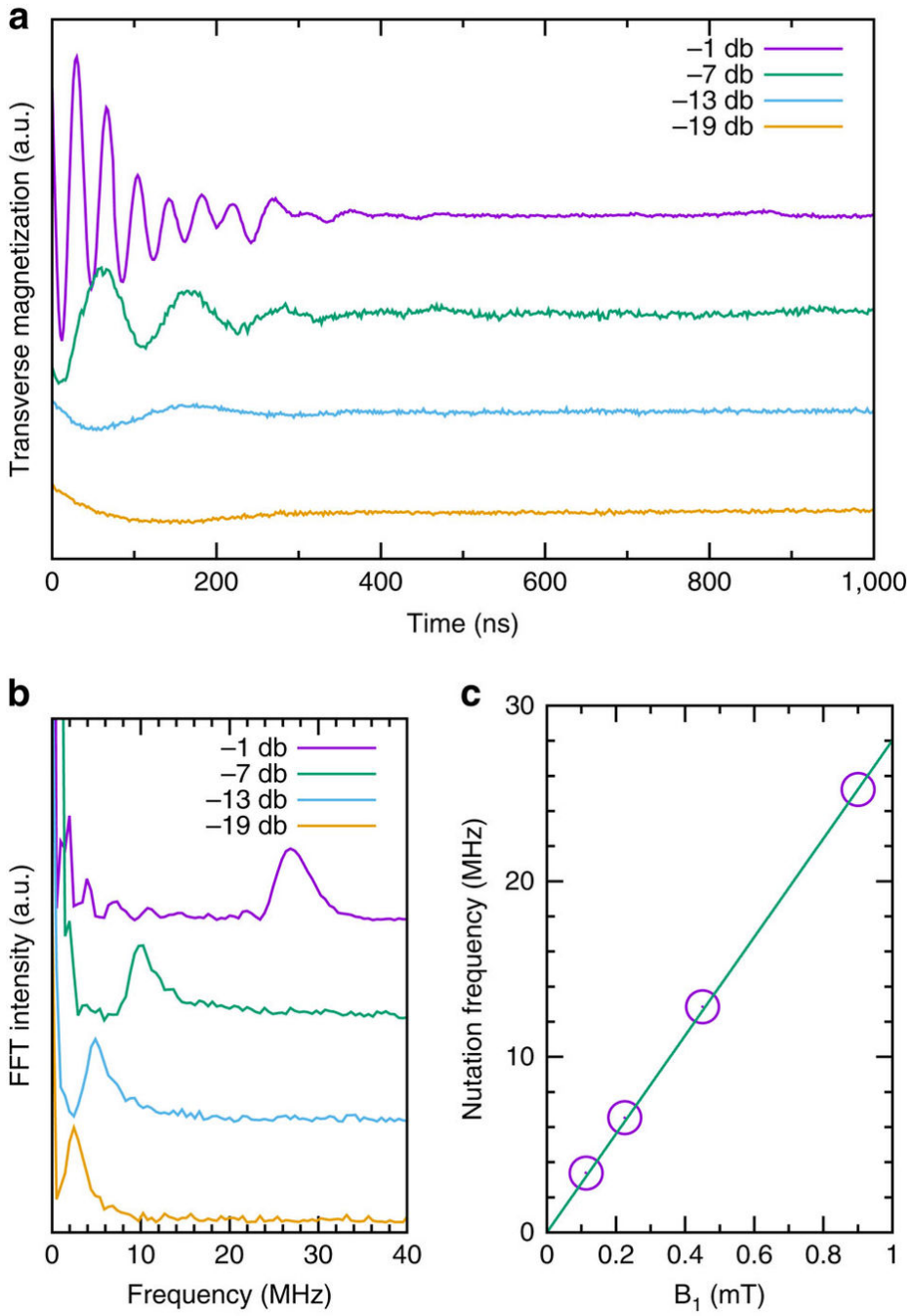
+ Homogenous conducting metallic-like carbon nanospheres of ~35nm size, stable in air and have a robust shelf-life;
+ Short disordered graphitic fragments that follow the curvature of a sphere, stable from at least -271°C to 400°C;
+ One step synthesis using common laboratory reagent, and no need for low temperatures, well-defined crystals, atomic manipulation, photonics, or the use of metals;
+ A solid-state material of workable dimensions for nanofabrication, easily processed and handled, and produced in quantities useful for quantum computing.

[f] https://www.nature.com/articles/ncomms12232

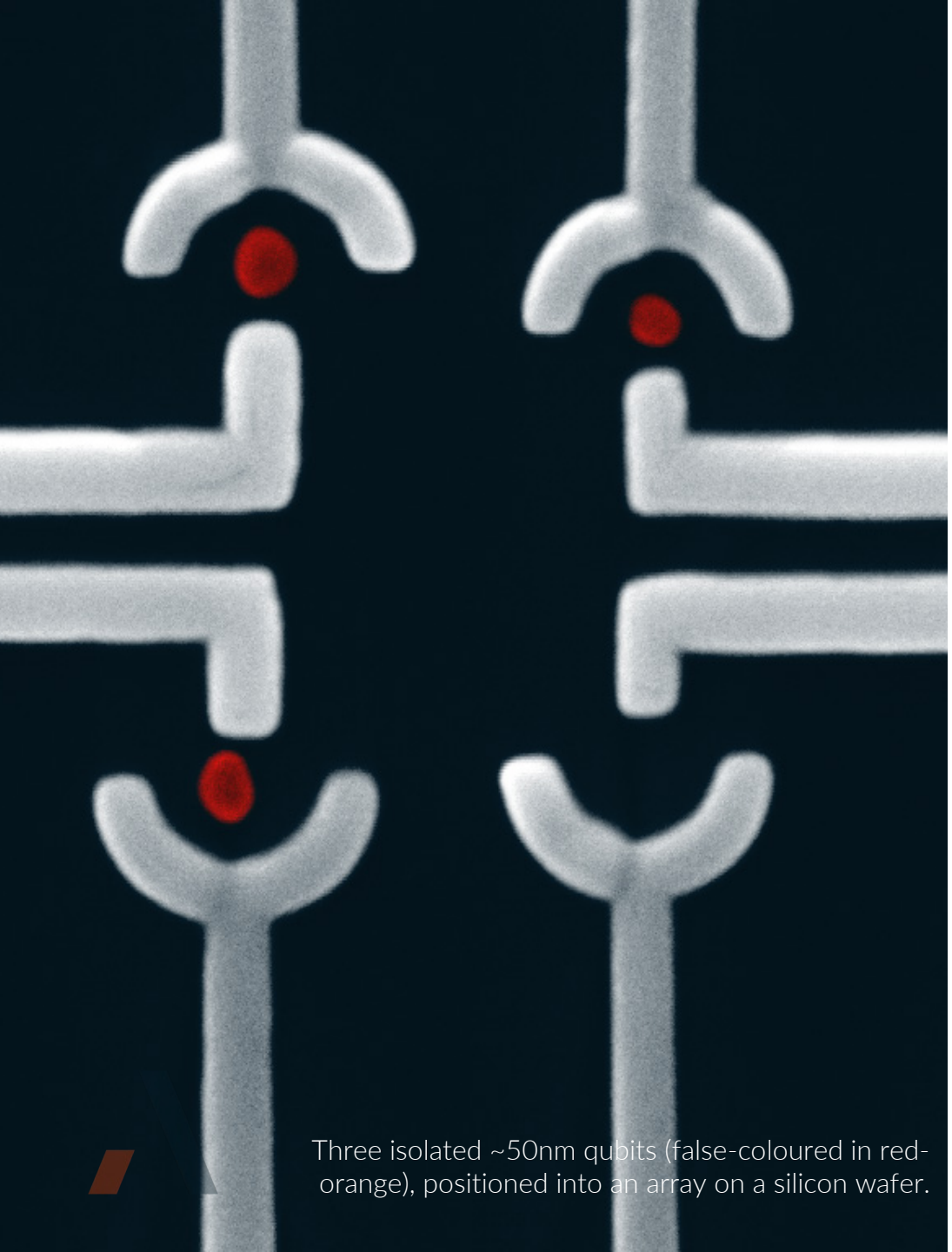
/ Practical Qubit Time Windows

The electron spins (S=1/2) in the carbon nanospheres are delocalised and polarisable (Pauli-paramagnetic) over the volume of the nanospheres:

+ Conduction electron T_1=T_2 of 175 ns at **+27°C** observed in 37±7 nm carbon spheres via cw-ESR on bulk samples;
+ Multi-frequency ESR (4–420 GHz) and -271°C to +27°C on bulk samples confirmed conduction electrons are confined within the carbon nanoparticles;
+ Coherent rotation of the electron spin qubits on the carbon nanospheres at **+27°C** by pulsed-ESR on bulk samples, with Rabi oscillations observed for ~400 ns;
+ *Operational temperature is not a design parameter; it is fundamentally determined by the intrinsic properties of a qubit material.*



(a) Rabi oscillations of the electron qubits at 27°C and B_0=337 mT for different microwave powers. (b) Fourier transform of the Rabi oscillations. (c) Rabi frequency is proportional with the square root of the power, indicating the presence of spin S=1/2.



Three isolated ~50nm qubits (false-coloured in red-orange), positioned into an array on a silicon wafer.

/ Qubit Scalability

Archer has recently achieved positional accuracy and control over qubit positioning, required to quickly build and test quantum information processing devices:

+ A single qubit was isolated and precisely positioned on a silicon wafer using top-down nanofabrication techniques to assemble the first qubit component of Archer's ^{12}CQ chip prototype*;

+ A few-qubit array was then demonstrated with three individual qubits isolated on a silicon wafer with metallic control electrode components aligned and deposited around the qubit array with nanoscale precision;

+ Archer unambiguously showed the possibility of scaling chip qubits in early development, meeting a global quantum computing industry key success driver**.

*https://archerx.com.au//src/uploads/2019/11/20191113_Scalable-assembly-of-qubit-array-components-ASX-Release.pdf

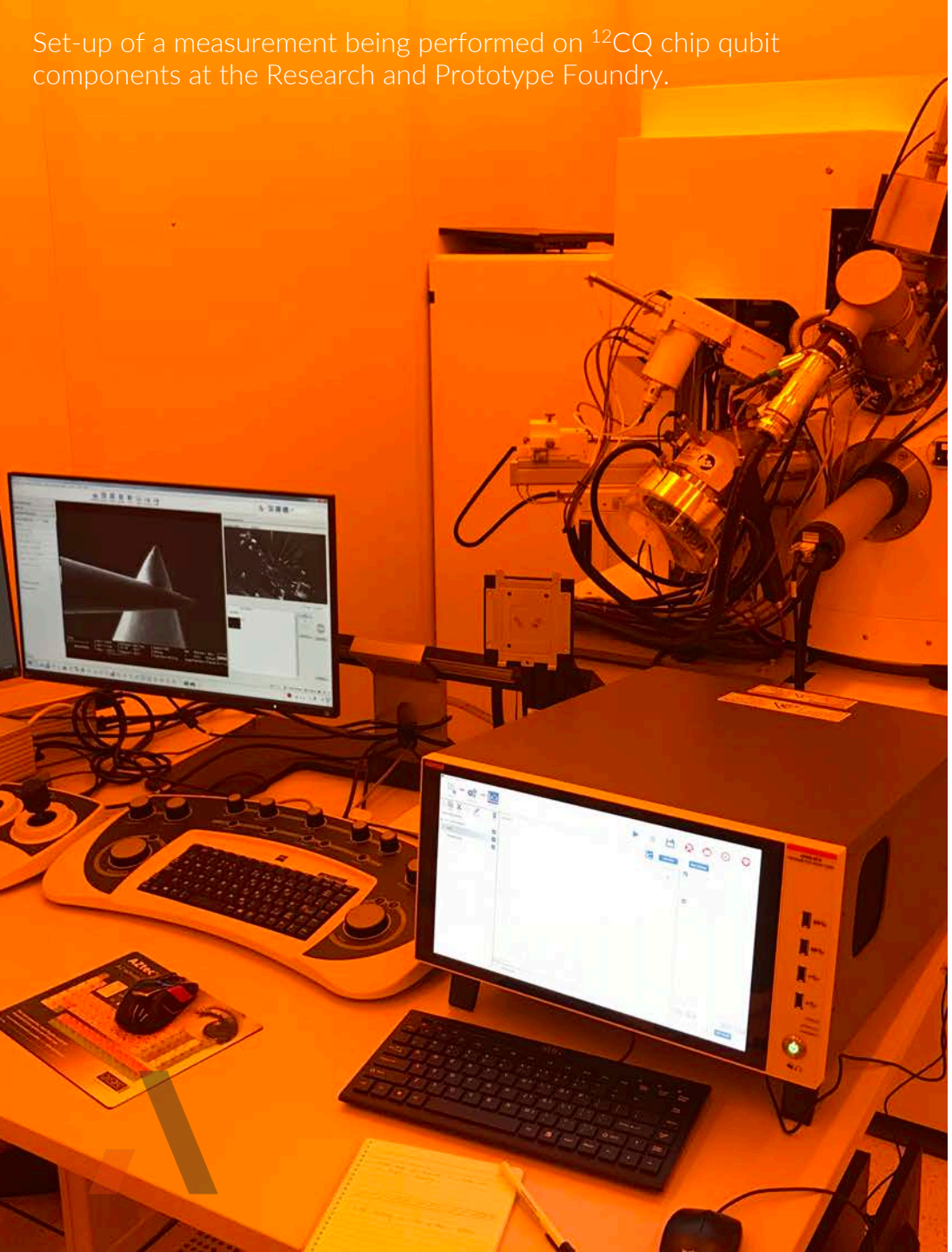
**https://www.bcg.com/enau/publications/2018/next-decade-quantum-computing-how-play.aspx

/ Intellectual Property

Archer's ^{12}CQ chip is a step-change quantum computing technology and in the current stage of development maintains a competitive advantage that is extremely difficult to erode:

+ Archer has exclusive rights to develop and commercialise the IP underlying the ^{12}CQ chip technology;
+ Patent applications are currently undergoing international prosecution in the EU, US, Australia, China, Japan, Hong Kong, and South Korea;
+ Archer's technical leadership in nanotechnology, materials chemistry, and quantum physics is overcoming substantial barriers to quantum computing adoption;
+ Archer intends to develop a qubit processor chip that can be directly sold and the intellectual property rights to the chip technology licensed.

Optical microscope image of the Archer & ^{12}CQ logos nanofabricated with the patent application number on chip.



Set-up of a measurement being performed on ^{12}CQ chip qubit components at the Research and Prototype Foundry.

/ Next Steps: Single Qubit Control

Archer's technology development roadmap over the next 12 months focuses on gaining access to the spin state of a single qubit residing on individual carbon nanospheres*, and to do so successfully:

+ The world-first ^{12}CQ chip development is being completed by Archer's own in-house team;
+ Archer has commercial access to the Research and Prototype Foundry in Sydney, to build the ^{12}CQ qubit processor chip (60+ personnel);
+ Collaborative partners at EPFL, Switzerland, provide development support with R&D personnel and infrastructure access (15+ personnel);
+ UNSW Sydney provides access to conduct state-of-the-art quantum measurements and materials characterisation (10+ personnel).

* https://archerx.com.au//src/uploads/2020/03/20200309_Progress-towards-single-qubit-quantum-measurements-ASX-Release.pdf

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

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ACN: 123 993 233

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LinkedIn: https://au.linkedin.com/company/archerexplorationltd
YouTube: https://bit.ly/2UKBBmG

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Appendices

Board and Executive Management

Greg English *LLB, BE (Mining)*
Executive Chairman

Greg English is the co-founder Archer. He has been Chairman of the board since 2008 and has overseen Archer's transition from a South Australian focussed minerals exploration company to a diverse materials technology company. He has more than 25 years of engineering and legal experience and has held senior roles for Australian and multinational companies. Greg has received recognition for his work as a lawyer in The Best Lawyers® in Australia, 2020 Edition in the area of Commercial Law.

Alice McCleary *DUniv, BEc FCA FTIA FACID*
Non-executive Director

Alice McCleary is a Chartered Accountant. She is Deputy Chair of the Uniting Church of South Australia's Resources Board. She is a former Chairman of ASX Listed Company Twenty Seven Co. Limited (ASX:TSC) and former Director of Adelaide Community Healthcare Alliance Inc. (ACHA), Benefund Ltd and Forestry Corporation of South Australia. Previous leadership roles include Vice-President of the South Australian Chamber of Mines and Energy (SACOME), Deputy Chancellor of the University of South Australia and National President of the Taxation Institute of Australia. Alice's professional interests include financial management and corporate governance.

Paul Rix *B.Com, FACID*
Non-executive Director

Paul Rix was appointed as a Director of the Company on 8 February 2016. Paul Rix is an experienced mining professional with more than 30 years' experience in the marketing of industrial minerals and products. From 2003 – 2013, Paul worked for Queensland Magnesia Pty Ltd (QMAG) as General Manager Marketing where he was responsible for the development and implementation of QMAG's long term marketing strategy, focusing on diversification of magnesia products and markets whilst maintaining high plant utilisation. His magnesia marketing responsibilities stretched across six continents and more than 30 countries.

Appendices

Board and Executive Management

Mohammad Choucair *PhD, FRACI FRSN GAICD*
Chief Executive Officer

Dr Mohammad Choucair was appointed Chief Executive Officer on 1st December 2017. Dr Choucair has a strong technical background in nanotechnology, and has spent the last decade implementing governance, control and key compliance requirements for the creation and commercial development of innovative technologies with global impact. Dr Choucair served a 2-year mandate on the World Economic Forum Global Council for Advanced Materials and is a Fellow of both The Royal Society of New South Wales and The Royal Australian Chemical Institute. He has a strong record of delivering innovation and has been recognised internationally as a forward thinker.

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

Damien Connor was appointed Company Secretary on 1 August 2014. Damien performs the financial/accounting role in the Company as well as the secretarial duties. Damien has been a member of the Institute of Chartered Accountants since 2002 and is a Graduate of the Australian Institute of Company Directors and a Member of the Governance Institute of Australia. Damien has been employed in the resources sector since 2005. He also provides Company Secretary and Chief Financial Officer services to other ASX-listed and unlisted entities.