THE NEXT FRONTIER IN COMPUTING

QUANTUM OPTICAL COMPUTING

TUNDRASYSTEMS GLOBAL LTD.

Presentation For
Venture Capital Investment

Dr. Brian Antao, CEO and Founder
http://www.tundrasystemsglobal.com

INDUSTRIAL/ECONOMIC/SOCIAL PROBLEMS TO BE ADDRESSED

1. The Saturation limits fast approaching conventional Semiconductor Technology – Top Clock Speeds and Shrinking further of device sizes.
2. Need to lay the solid foundation for the *Next Frontier of Computing*.
3. Need to be Power and Energy Efficient.

Develop a solid foundation with which the next frontier of computing products in the HPC sector can be built, in future generations to come we expect to see our technology being pervasive in all aspects of computing.

LIMITATIONS OF TODAY'S SEMICONDUCTORS

- Current hybrid electric/optical systems are limited by the necessary conversion of photons to electronics, and back.
    - *This is similar to a bullet hitting a lead wall, which then must convert back again into a bullet to complete a computing operation*.
- New software and models are needed to enhance scalability and performance for large numbers of applications, such as Big Data, financial analysis and more.
- The next challenge is developing high performance systems, low latency, easy scalability with low power consumption.
- Because of fundamental limits in electronics, the classical semiconductors technology only provides a limited solution.

"There are serious exascale-class problems that just cannot be solved in any reasonable amount of time with the computers that we have today." Buddy Bland, project director at the Oak Ridge Leadership Computing Facility in Oak Ridge, Tenn.

OUR TECHNOLOGY SOLUTION

- Eliminate the limits of Electronics approach, replaced by all-optical modes.
- Removes propagation delay of electrons resulting in faster CPU clock speed.
- Maximises power efficiency and long distance signal transmission enabling Exascale level data-centers.
- A new computational paradigm opens up a vast range of applications and advantages.
- Optimizes Quantum parallelism/superposition/entanglement.
- A large number of processor-cores greatly enhancing the multitasking capabilities of the systems.

OUR VISION AND WHY WE ARE DIFFERENT

To truly capture and enable the opportunities of optical speed of transmission, we will design the ***first*** commercial Silicon Photonics Quantum Technology Solution.

We will create a packaged product line of “all-optical” high-performance computing (HPC) - Units using the developed *Quantum Silicon-Photonic Technology*.

In contrast to previous optical computing approaches, we are using the state-of-the-art Quantum Models implemented using Photon Polarised Optical Technology in Silicon Photonics, for Room Temperature operation.

OPTICONDUCTORS: *THE FUTURE OF SEMICONDUCTORS*

Mission:

To develop the Next Frontier of Computing Solutions in a Silicon Photonics Technology that address the limitations of Semiconductors.

We want to do it and We want to get it absolutely right !

OPTICONDUCTORS: *THE FUTURE OF SEMICONDUCTORS*

Goal:

Introduce a new Manufacturing ***Quantum Photonic Technology*** which will be used to implement a complete HPC Computing Solution.

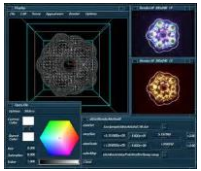
MARKETS

- *To Exploit in a very timely manner and be the first in class for the Next Frontier of Computing – Quantum Photonics/Optics*.
- A very Long term strategic plan to develop as the ultimate end product line of “All-Optical” High-Performance Computing Units that are tailored to the following Market Segments:

Financial Stock Markets
Algorithmic Trading Analysis

Big-Data Analytics

Medical/Pharma Drug Discovery Analysis & Modelling



High-end Graphics
3D Motion picture production
Data visualisation.

HPC applications in the Defence Sector

CyberSecurity applications
Cryptography
CryptAnalysis

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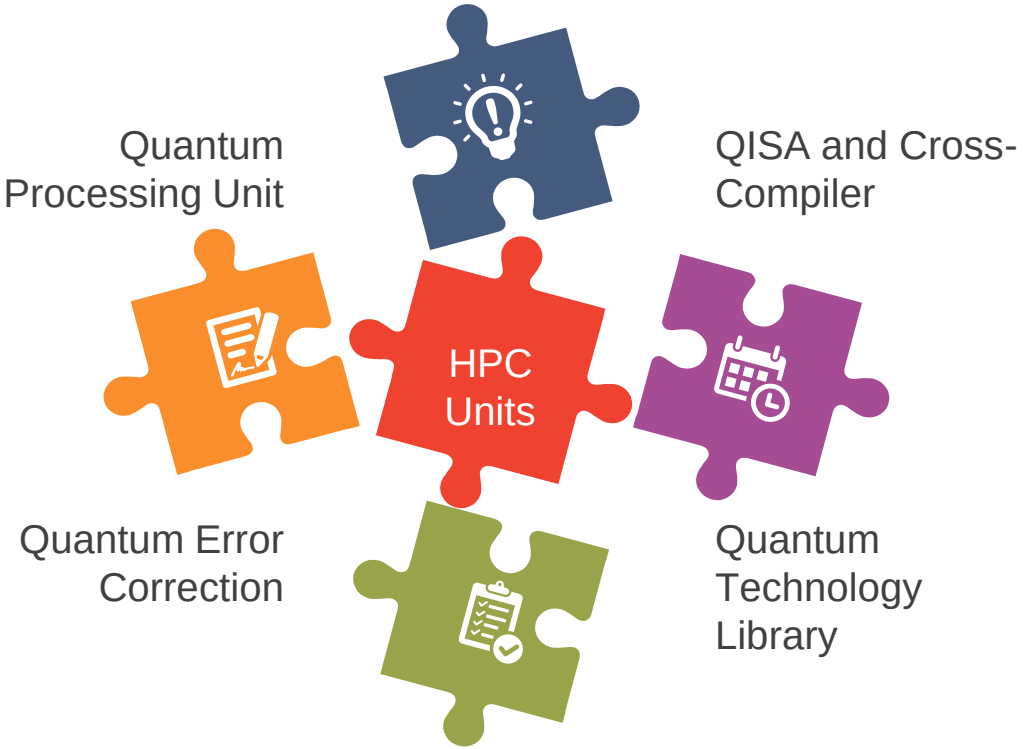
THE BUSINESS MODEL

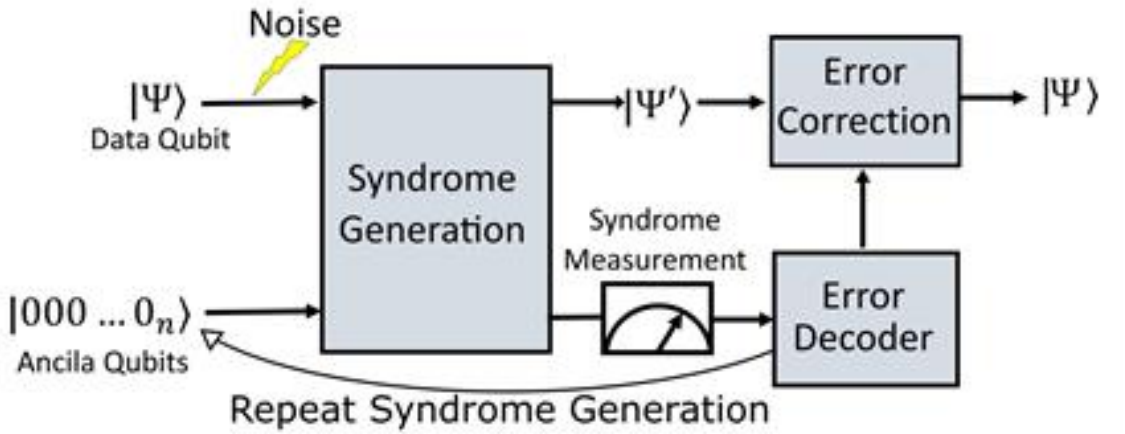
- *Service High-End Market Segments that have the greatest pain in terms of Computational Requirements*.
- Use a Direct Go-To-Market Strategy to engage Customers in these Segments.
- Maximise revenue by Maximising Pricing strategies to critical customers.
- *Create a Product requirement that these Market Segments cannot do without*.
- ***HPC Units*** that we develop will be targeted to compose solutions that address low-end High-Compute requirements to top-end Exascale Super-Computer Configurations.

PRODUCT STACK



QUANTUM ERROR-CORRECTION TECHNOLOGY

- Generalized Hardware-Software Quantum Error Correction Solution
- Finds application in Quantum Computing and Communications
- Includes a Deep-Learning Silicon-Photonics Co-processor.



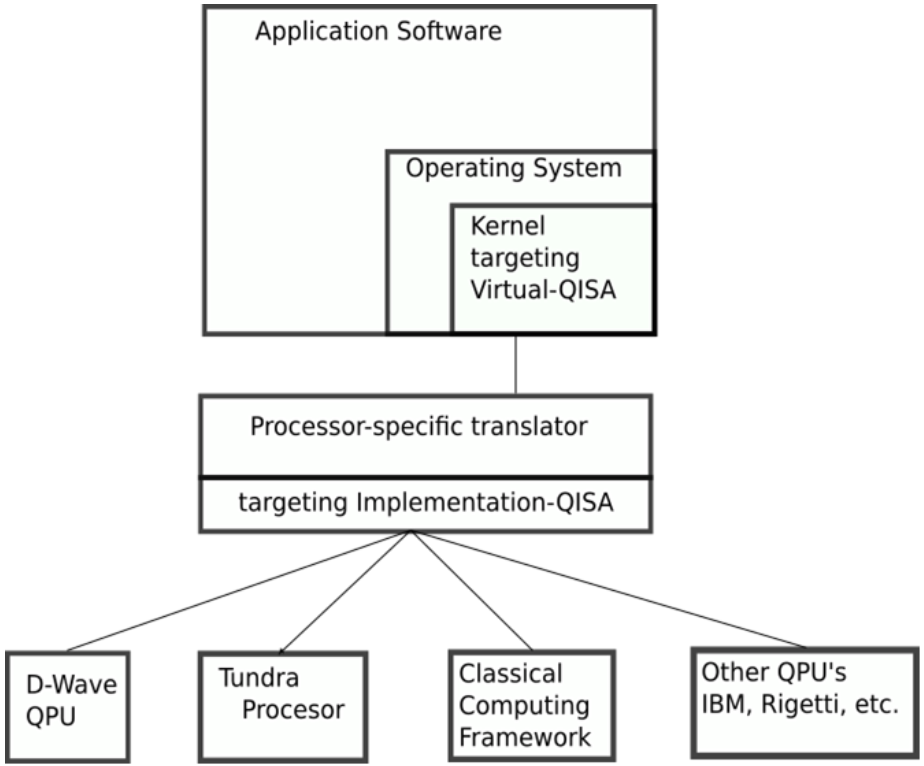
THE QUANTUM PHOTONIC TECHNOLOGY

- Implement over Silicon Photonics Base
- All-optical ultrafast switches and Qubits.
- Quantum Memory Cells using Phase Change Materials and Rare Earths
- Quantum Gates.
- Quantum Interconnect.
- Using a Fabless Model, Technology implemented at Manufacturing Partners such as LioniX, Mellanox.

QUANTUM PROCESSING UNIT

- Silicon Photonics Qubits
- Striving for a 64-Qubit Processor
- Employs Deep-Learning based Quantum Error Correction
- Room-Temperature Operation

QISA AND CROSS-COMPILER (SOFTWARE)



MARKET POTENTIAL

The worldwide high-performance computing (HPC) market is expected to grow at an 8.3% CAGR, reaching $44 billion in 2020.

The global HPC market will generate $220 billion in revenues from 2015-2020.

The Quantum Computing Market is expected to grow at a 10.4% CAGR, reaching $26 billion in 2020
Cyber Security Market worth $170.21 Billion by 2020

We expect to capture a significant portion of these markets.

COMPETITORS

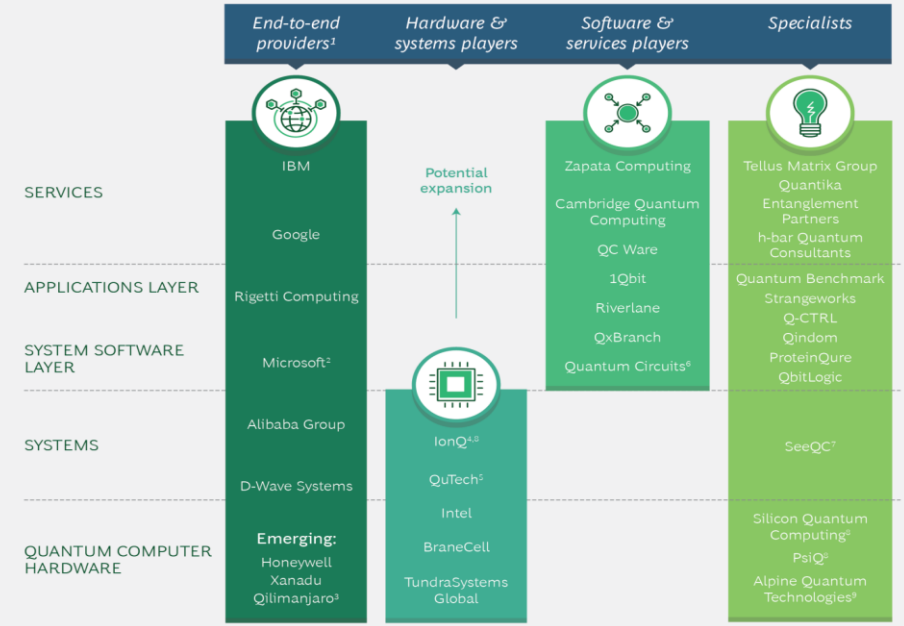
- Our main competitor in the Quantum Photonics space is ***PSiQuantum***.
- The number of specialised Optical Computing endeavours are scant. To name one -- ***Optalysys*** is a University of Cambridge based effort at Optical Computing, that is developing a very specialised non-linear equation solution strategy using Fourier transforms.
- D-Wave/Rigetti/IBM/Google are a major development in Quantum Processors but use superconducting Josephson junctions based Qubits that need *deep super-cooling*.
- ***Microsoft*** solution using Topological Qubits.
- Implementations using ion traps at ***ionQ***.
- As of Today we are yet to see a full scale Commercial Universal Quantum Computing Solution.

COMPETITOR ANALYSIS: TECHNOLOGY COMPARISON

TundraSystems Technology	D-Wave/Rigetti Technology
Develop a Photonic Microprocessor	Build a SuperComputer
All-Optical Technology	Superconducting Technology
Silicon Photonic Qubits	Superconductor Qubits
More Energy Efficient as All-Optical	High-Power Consuming SuperComputer
Configurable HPC Systems	$20 Mil. SuperComputer
Strive for Room-Temp. Operation	Requires Deep Super-Cooling

COMPETITOR LANDSCAPE

EXHIBIT 1 | Companies Assume Four Roles Across Layers of the Stack in the Quantum Computing Ecosystem



Sources: Quantum Computing Report (quantumcomputingreport.com); BCG analysis.
[1]Based on player's ambition with varying levels of maturity and service activities.
[2]Multiple technologies in the labs with focus on topological qubits.
[3]Qilimanjaro is a spinoff from the University of Barcelona.
[4]AWS is invested in IonQ.
[5]QuTech was founded by TU Delft and TNO, and has collaborations with Intel and Microsoft.
[6]Quantum Circuits (QCI) is a spinoff from Yale University.
[7]SeeQC is a subsidiary of Hypres.
[8]Vision to become end-to-end provider.
[9]Alpine Quantum Technologies (AQT) is a spinoff from University of Innsbruck.

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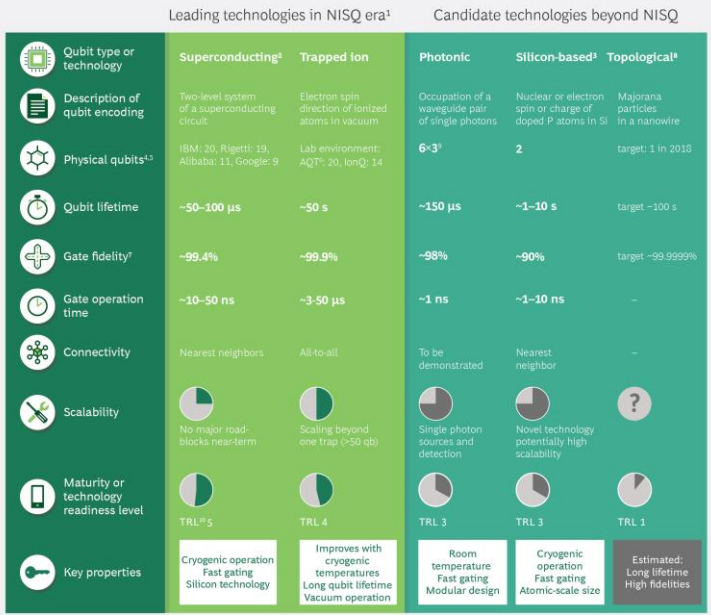
QUANTUM TECHNOLOGY LANDSCAPE

EXHIBIT 7 | Overview of Leading Quantum Computing Technologies During the NISQ Era



Sources: BCG analysis; expert interviews.
[1]Noisy Intermediate-Scale Quantum devices era.
[2]Currently only technology with external cloud access; several forms (charge, flux, phase) of qubits exist but most pursue a less noise-sensitive charge-based qubit (transmon).
[3]Additional approaches include Si and SiGe quantum dots.
[4]Demonstrated ability to perform single and two-qubit gates.
[5]Announcements of next-generation qubit architecture: Intel: 49, IBM: 50, Google: 72, Rigetti: 128 (all superconducting qubits), IonQ: 50 (trapped ion), Hefei University: 50 (photonic).
[6]Alpine Quantum Technologies.
[7]Two-qubit fidelity.
[8]Microsoft roadmap to build first quantum computer in 2023.
[9]18 qubits were encoded with six photons using three degrees of freedom.
[10]Technology readiness level.

MILESTONES ACHIEVED TO DATE

1. Our Technology Solutions are matured and entering into *TRL-3*
2. Development of Ultrafast High Precision and High Fidelity Quantum Devices
3. Development of a Deep Learning Quantum Error Correction Framework.
4. Development of Tundra QISA and Cross Compiler.
5. Partners include:
    a. University of Exeter
    b. Imperial College
    c. Cardiff University
    d. Mellanox Technologies
6. We seek funding to drive our *Industrial R&D Capability* to advance to *TRL-8* and Full Commercialization

TARGET MILESTONES

Currently seek Seed Round of Funding.

Seed Stage 1 – First 12 months Estimated Seed Funding Required £1.6 Millions

Implement a. High Precision Devices b. QISA and Cross-Compiler.

Stage II – Second and Third year Estimated Funding Required £10.0 Millions

Develop demonstrable Core TundraProcessor (Microprocessor)

Stage III – Forth year Estimated Funding Required £15.0 Millions

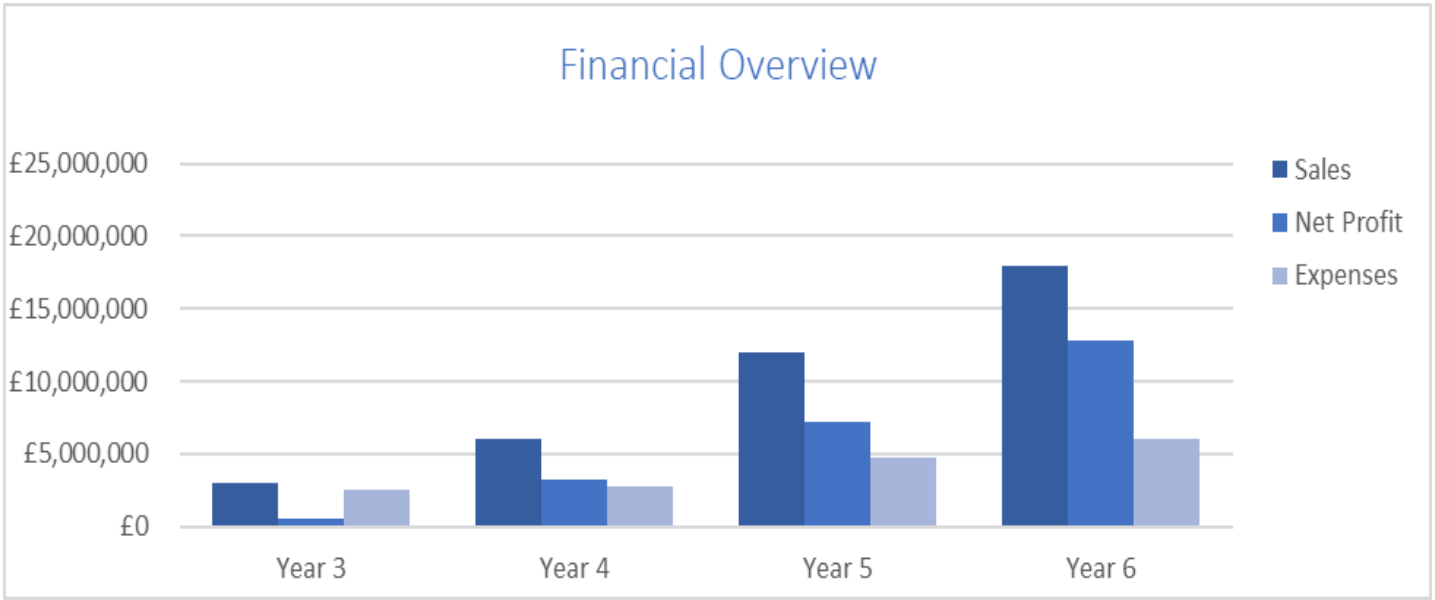
Start Subsystem Development + Complete Production grade TundraProcessor

Stage IV – Fifth and Sixth year Estimated Funding Required £25.0 Millions

Complete System Integration of packaged HPC Solutions

FINANCIAL PROJECTIONS

Year 3 Revenue stream begins with marketing of Cross-Compiler



SEED ROUND USE OF MONEY

First Seed Round -- £1,600,000/- to fund the first 12 Months of development.

Equity on offer 15% Stake (Negotiable !).

Expense Items:

1. Computer Infrastructure £250,000.00
2. Office Space + Furbishing £100,000.00
3. Management and Technology Team Wages £750,000.00
4. Photonic CAD Software licenses £150,000.00
5. Additional Support Staff Wage Bill £100,000.00
6. Manufacturing Costs £150,000.00
7. Miscellaneous Expenses £100,000.00

Total for the first one year's of operations £1,600,000.00

KEY INVESTMENT HIGHLIGHTS

Why Should you invest in TundraSystems Global LTD:

- Help in advancing the next frontier of computing for humanity's benefit.
- A strong Business Case for a Quantum Optical Computing Solution.
- Wide application market segments including CyberSecurity.
- Strong technology team derived from the top global research universities.
- Prospects for a very good Return on Investment.

THE TEAM

Dr. Brian Antao -- CEO

Ms. Antonella Rubicco – Chair Non-Exec Board

Our Technical Advisory Board is composed of Experts as follows:

- Professor Xinliang Zhang of Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China.
- Professor Diana Huffaker, from Cardiff University a specialist in Photonics devices.
- Professor Anna Baldycheva, is a Silicon Photonics and Graphene Expert from University of Exeter, UK.
- Dr. Tsjerk Hoekstra of EFFECT Photonics, Netherlands.

THE TEAM

1. Dr. Mukund Buddhikot – Technical Director of Hardware Design
2. Dr. Steven R. Hutsell – Chief Processor Architect
3. Prof. Anna Baldycheva – Interim Director of Silicon Photonics
4. Dr. Patricia Charlton – Director of Artificial Intelligence
5. Ms. Margaret Morgan – Agile Methodologies Specialist and Coach
6. TBA – Operations Manager
7. Dr. Alessandro Alabastri – Member of Technical Staff/Design Team
8. Dr. Devin S. Vega – Member of Technical Staff/Design Team
9. Dr. Chris Morrison – Member of Technical Staff/Design Team
10. Dr. Liang Ye – Member of Technical Staff/Design Team

CONTACT:

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Thank you and we look forward to working with you!

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