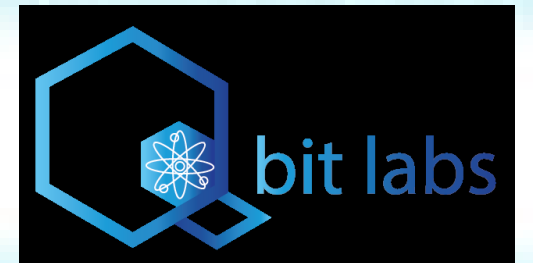


BUILDING ECOSYSTEMS FOR QUANTUM TECHNOLOGIES

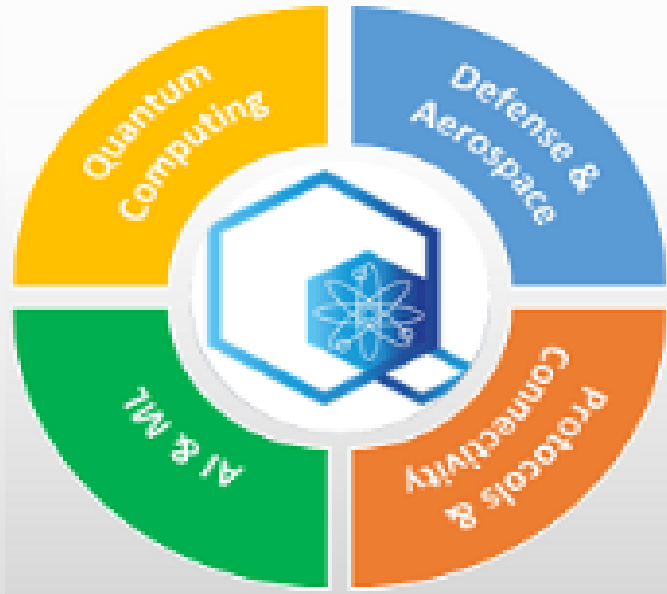
PRADEEP KUMAR, TEC, MAR 2023



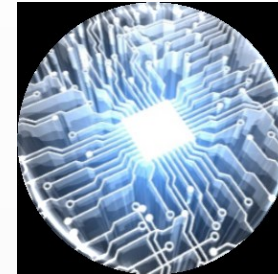
About Us



- R&D company by IIT Alumni
- More than a decade experience of technology development
- Wide FPGA based exposure in Emerging technologies – 5G, WiFi6, PCIe Gen6, USB, 400G Ethernet

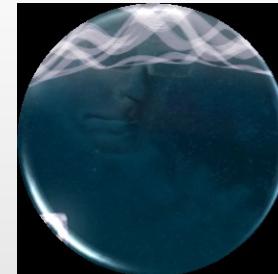


“Makes something possible through emerging technologies that simply isn’t possible with a classical way”



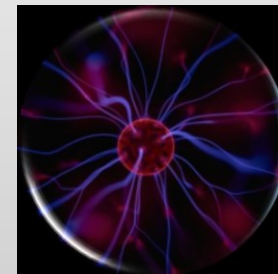
Quantum Computing

- Supporting Quantum Computing players
- AI/ML Applications



Quantum Cryptography

- QKD
- Q-Algo Implementation



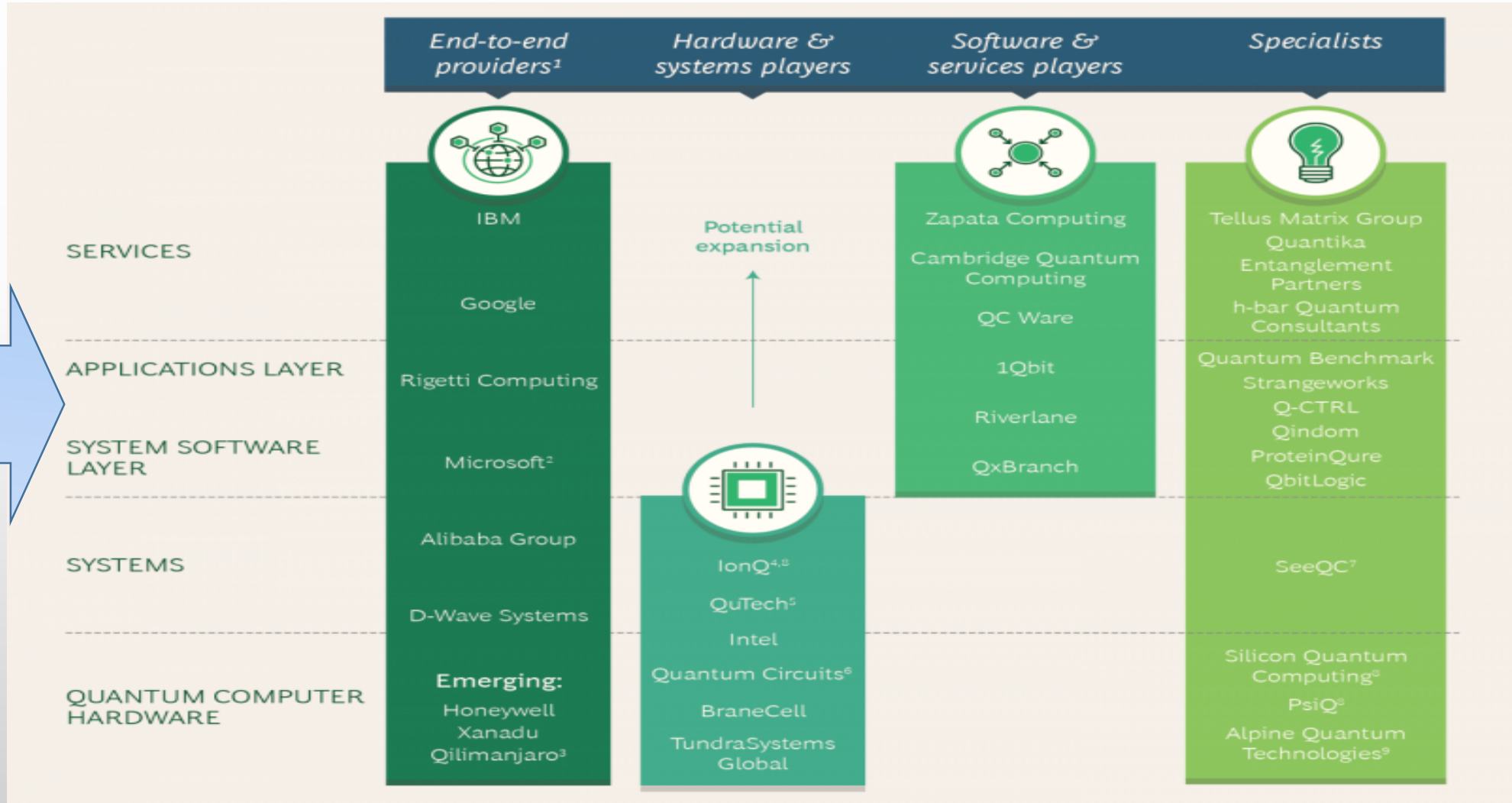
Quantum Communications

- Quantum Control Systems
- Q-FECs

Quantum Ecosystem – Global Landscape



Major Players & their Segmented Portfolio



Quantum Ecosystem – Global Landscape



Quantum Encryption



Quantum Hardware – Optical/Solid State



Quantum Software



Quantum Cloud Computing



Quantum AI

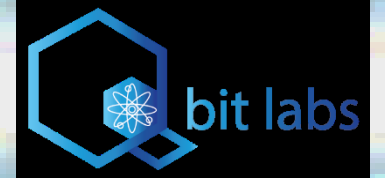
Quantum Circuits

Quantum Ecosystem – Global Landscape



Users <i>Select examples</i>	Applications <i>Not mapped to verticals</i>	Software offerings <i>Includes control software</i>	QPUs ²		Hardware / components <i>Select examples only – not representative of entire ecosystem</i>						
Material Science	Not strictly categorized given diversity of operations ¹		Superconducting		Cryogenics (includes testing)						
Finance			<table border="1"> <tr> <td data-bbox="1210 828 1569 879">Ion Trap</td> <td data-bbox="1579 828 1926 879">Neutral Atoms</td> </tr> <tr> <td data-bbox="1210 885 1569 1039"> </td> <td data-bbox="1579 885 1926 1039"> </td> </tr> </table>		Ion Trap	Neutral Atoms			<table border="1"> <tr> <td data-bbox="1936 828 2392 879">Lights and lasers</td> </tr> <tr> <td data-bbox="1936 885 2392 1039"> </td> </tr> </table>	Lights and lasers	
Ion Trap	Neutral Atoms										
Lights and lasers											
Life Sciences			<table border="1"> <tr> <td data-bbox="1210 1045 1569 1096">Silicon</td> <td data-bbox="1579 1045 1926 1096">Photonics</td> </tr> <tr> <td data-bbox="1210 1102 1569 1250"> </td> <td data-bbox="1579 1102 1926 1250"> </td> </tr> </table>		Silicon	Photonics			<table border="1"> <tr> <td data-bbox="1936 1045 2392 1250">Other componentry (examples)</td> </tr> <tr> <td data-bbox="1936 1102 2392 1250"> </td> </tr> </table>	Other componentry (examples)	
Silicon	Photonics										
Other componentry (examples)											
Other	<table border="1"> <tr> <td data-bbox="415 1165 772 1216">Cloud access to QPUs</td> <td data-bbox="782 1165 1200 1216">Simulators / q-inspired / etc</td> </tr> <tr> <td data-bbox="415 1222 772 1386"> </td> <td data-bbox="782 1222 1200 1386"> </td> </tr> </table>		Cloud access to QPUs	Simulators / q-inspired / etc			<table border="1"> <tr> <td data-bbox="1210 1256 1926 1386">Other</td> </tr> <tr> <td data-bbox="1210 1313 1926 1386"> </td> </tr> </table>		Other		
Cloud access to QPUs	Simulators / q-inspired / etc										
Other											

Quantum Ecosystem – Global Landscape



Quantum development kits –
for coding in quantum assembly
languages



QCaaS subscription services –
for use-case exploration, algorithm
development, and simulation



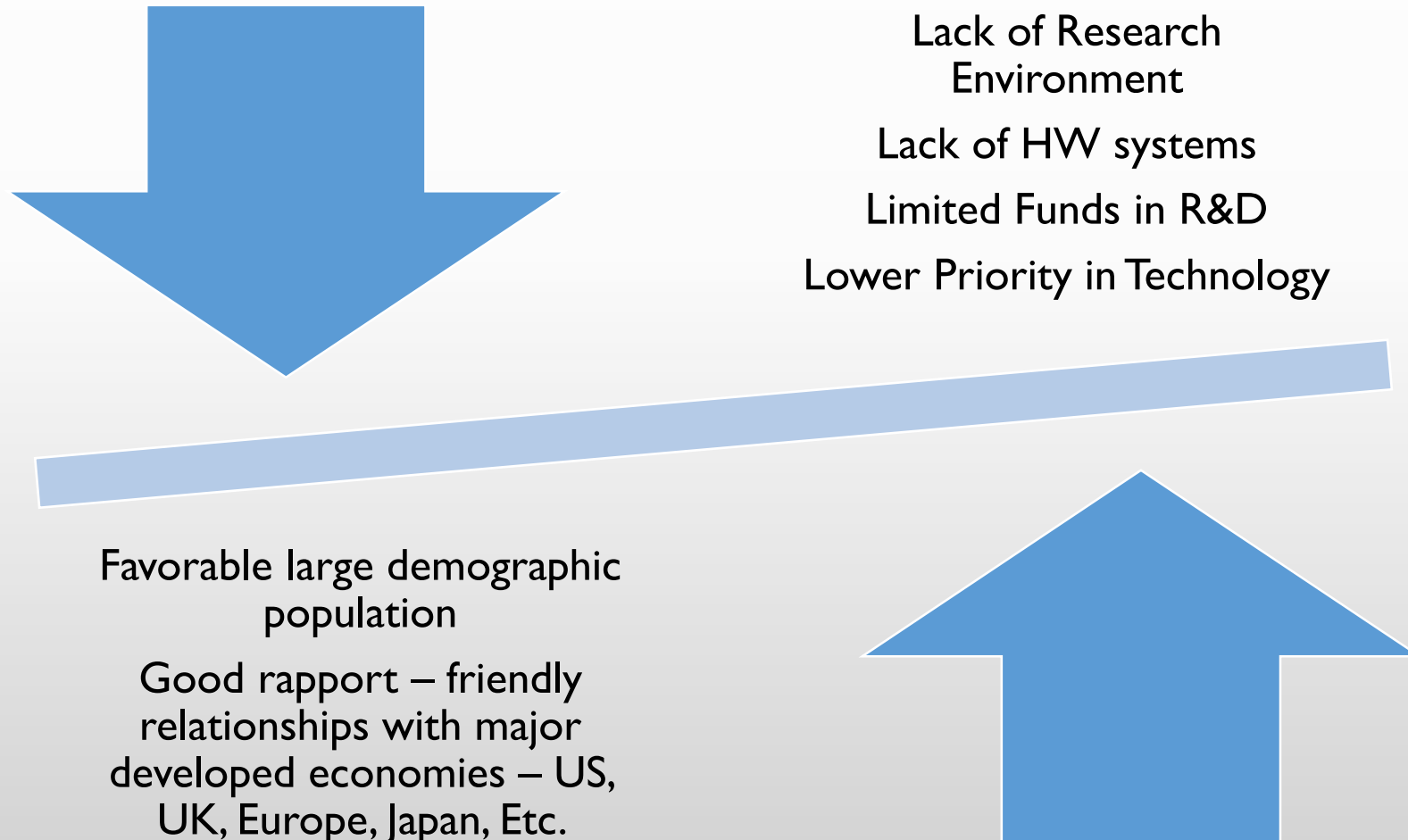
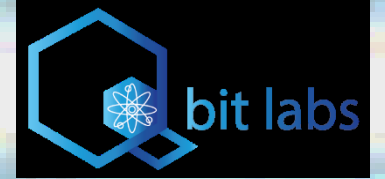
Partnerships with startups – to
drive rapid innovation in QC
initiatives



Quantum hardware – to access
quantum machines with enormous
compute capacities



Indian Challenges & Advantages



Quantum Ecosystem – Workforce Oriented



Sector Wise Q- Companies

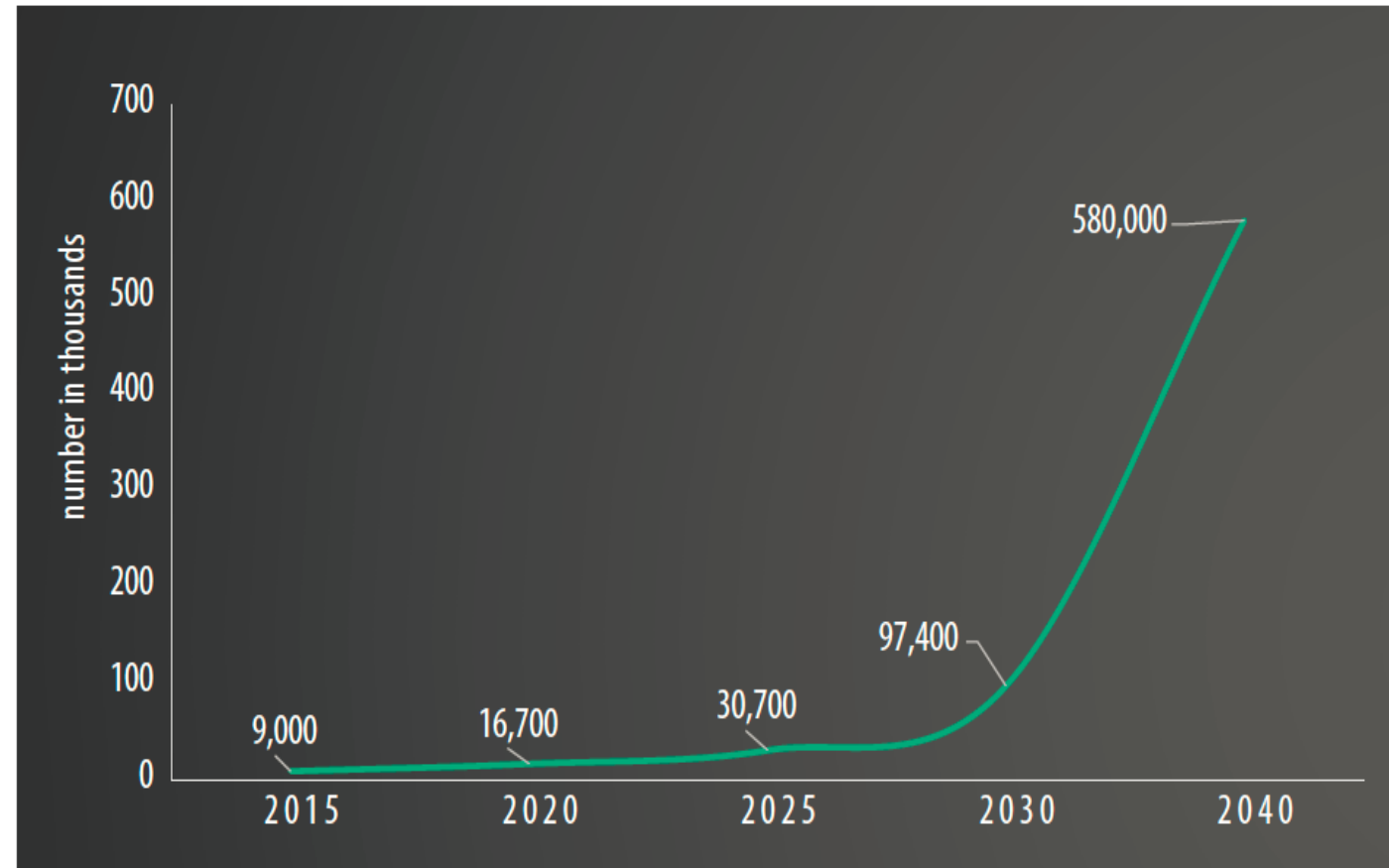
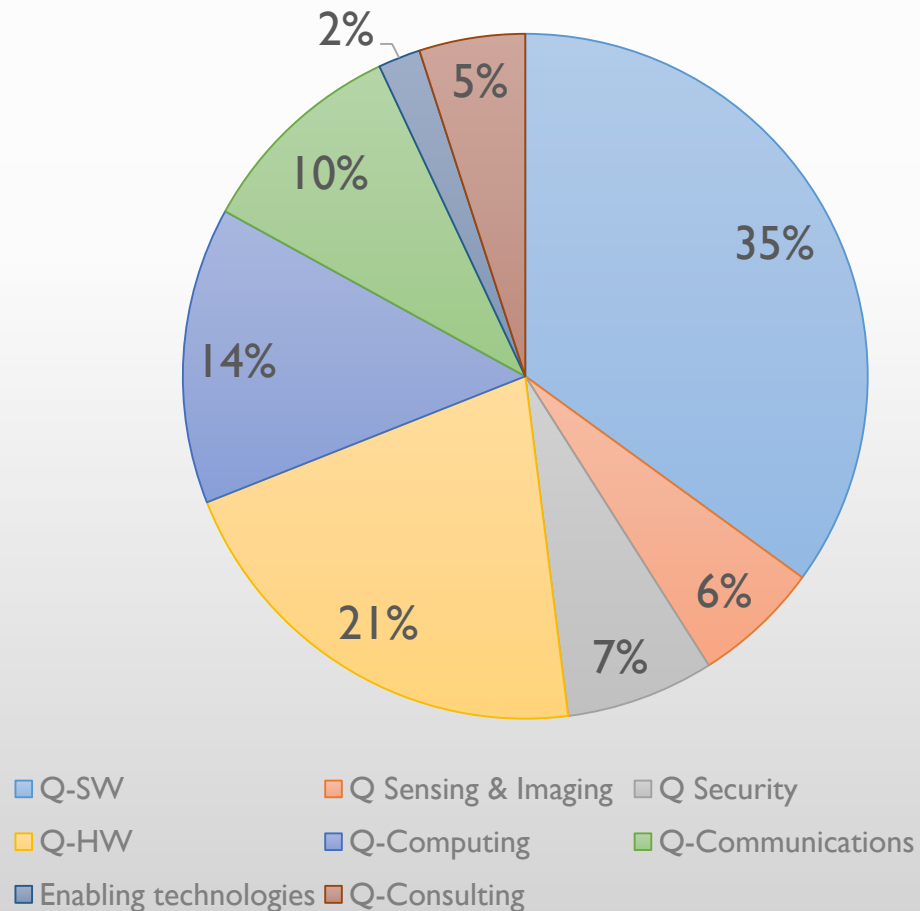


Fig. 4 Estimation of global number of jobs created for the quantum technologies market in the next two decades.

Conclusion .. Way Forward



- Skilled Manpower
 - Proven record in IT & Semicon
 - Prepare ourselves with Quantum engineering workforce
- Quantum Hardware
 - Technological Alliance with Global Players
 - Build Indigenized Quantum Computer – Large Investment
- Hardware Fabrication
 - Target End-2-End Q-computers – material to finished computer
- Political Thrust & Support
 - Movement in Quantum Mission
 - Priority Investment

THANK YOU