1 **Motivation for Quantum Technology**

2 **Potential Application Areas in Finance**

3 **Quantum Technology in Action @ LTIMindtree**

4 **Quantum Jumpstart with LTIMindtree**
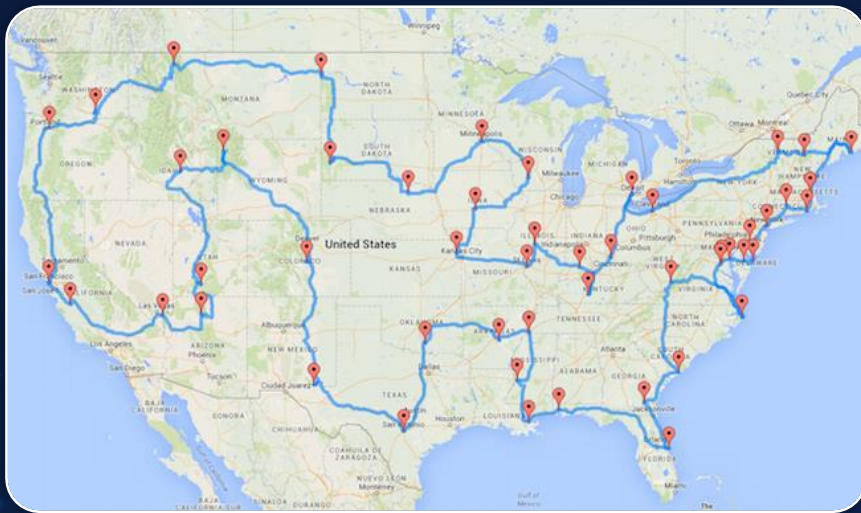
Fundamentally Different Technology..

Fundamentally different Technology

LTIMindtree
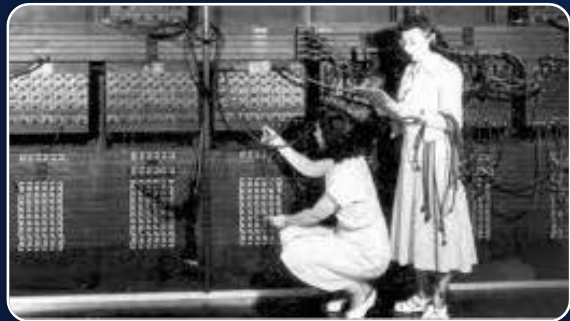
What are such 'To the Mars' problems in Computing?

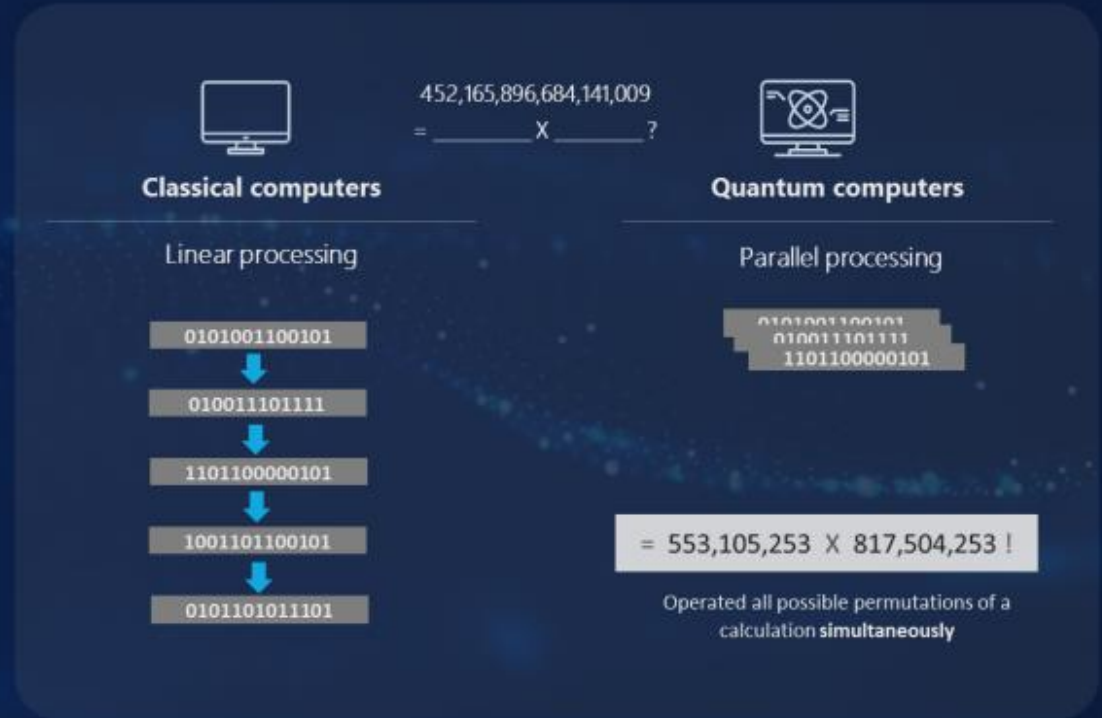## Optimization

Find the shortest path for
Number of Cities: N
Possible number of paths: (N-1)!/2

Cities	Number of possible routes
10	181,440
14	3,113,510,400
20	60,822,550,204,416,000 (qd)
28	5,444,434,725,209,180,000,000,000,000 (oc)

Security

452,165,896,684,141,009 = _____ X _____ ?

Classical computers — Linear processing

0101001100101
↓
010011101111
↓
1101100000101
↓
1001101100101
↓
0101101011101

Quantum computers — Parallel processing

0101001100101
010011101111
1101100000101

= 553,105,253 X 817,504,253 !

Operated all possible permutations of a calculation **simultaneously**

Factorization, a key to Today's encryption stands challenged by the advent of quantum computing!

Difference is Power of Exponential

Super Position

Entanglement

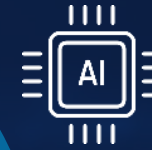**Classical Bits**

0 1

00 / 01 / 10 / 11

Quantum Bits

0 0

$|00\rangle, |01\rangle, |10\rangle, |11\rangle$

2^n

POWER OF TWO
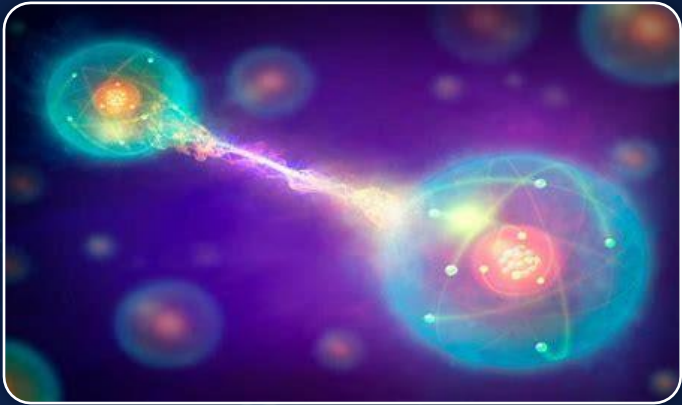
Logical Qubits	Number of Superpositions
10	1024
54	18,014,398,509,482,000
80	1,208,925,819,614,630,000,000,000
100	10^{30}

Problems	Classical time	Quantum algo time	Speedup
Factorization	2^N	N^3	Exponential
Search	N	Sqrt(N)	Quadratic
Simulation	2^N	N^C	Exponential

Potential Application Areas in Finance

Quantum Impact: Potential Application Areas in Financial Services

- *Portfolio Optimization*
- *Collateral Optimization*
- *Offer Allocation*

Demo

- *Post Quantum Cryptography*
  - *Secure financial Transaction*
  - *Regulatory Compliance*

Demo

- *Tokenization*

Demo

Optimization

Quantum AI/ML

Cryptography
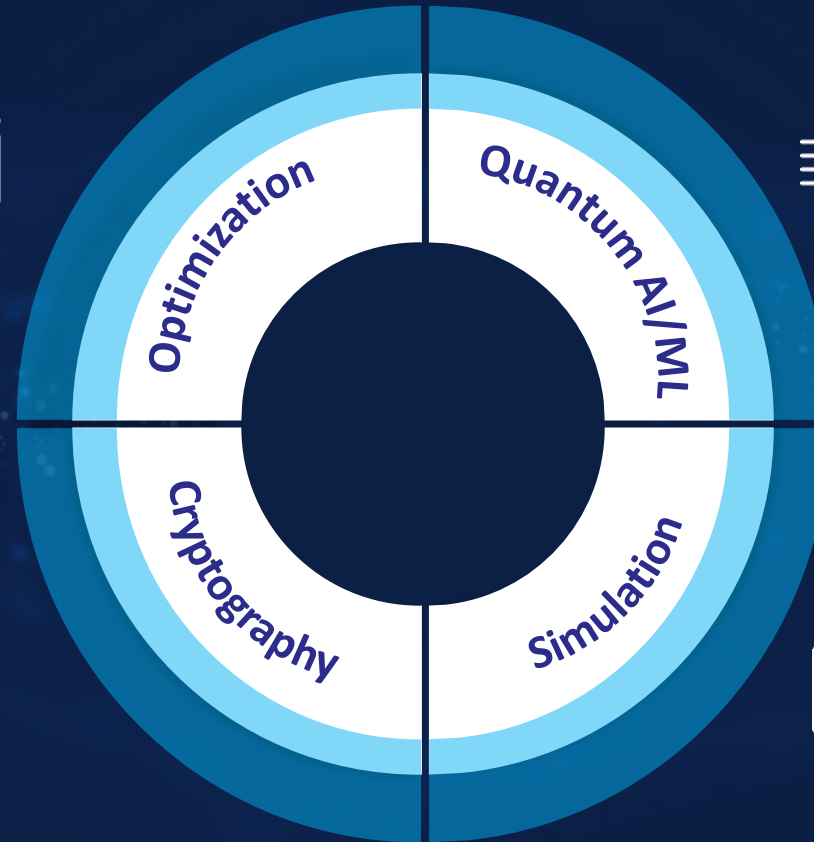
Simulation

- *Fraud Detection*
- *Credit-Decision algorithms*
- *Customer targeting and prediction modeling*
- *Deep Hedging*

Demo

- *Market simulation (e.g., Asset pricing)*
- *Risk Analysis*
- *Monte Carlo simulation*

Companies in the Financial Services sector are exploring Quantum

Top 5 bank in the world

Quantum algorithms for Deep Hedging, Portfolio Optimization, Option Pricing, and Risk analysis

US based Top 10 commercial bank

Joined IBM Quantum Accelerator program, research on cybersecurity and AI

US based large global bank

Generating random numbers for securing communications

Canadian Investment bank

POC with Xanadu on computational speed-up and accuracy improvement for Monte Carlo simulation

One of the leading FinTechs

Quantum - Classical Hybrid ML for Payment Fraud Detection

Canadian multinational banking and financial services company

POC on computational speed-up and accuracy improvement for Monte Carlo simulation

US based Fortune 500 financial services company

Part of IBM Q Network; developed a quantum simulator; quantum algorithms for fraud detection, stock price prediction; QRNG for masking data

Top 25 US financial holding company

Joined Microsoft's Enterprise Acceleration Program; partnered with Multiverse Computing to explore creating investment portfolios

LTIMindtree: A Quantum Ready partner

Strong Complimenting Workforce

- 20+ strong team
  - 5 PHDs
  - Research Engineers
  - Quantum Native Developers
  - ML engineers
  - Domain experts

- Certified in latest frameworks (e.g. IBM Qiskit, Dwave Ocean, PQC, Quantum Cryptography etc.)

Collaborative Ecosystem Development

IBM

D:WAVE
The Quantum Computing Company™

QUANTUMXCHANGE™

UNIVERSITY OF OXFORD

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

Research and Development

- **'Science Led and Enterprise Driven'** Applied research approach

- Industry-focused use cases
  - Quantum ML for Fraud detection
  - Portfolio Optimization
  - Logistics Optimization

Expertise in Key Focus Areas

- Optimization Problems
- Quantum Machine learning
- Post Quantum Cryptography
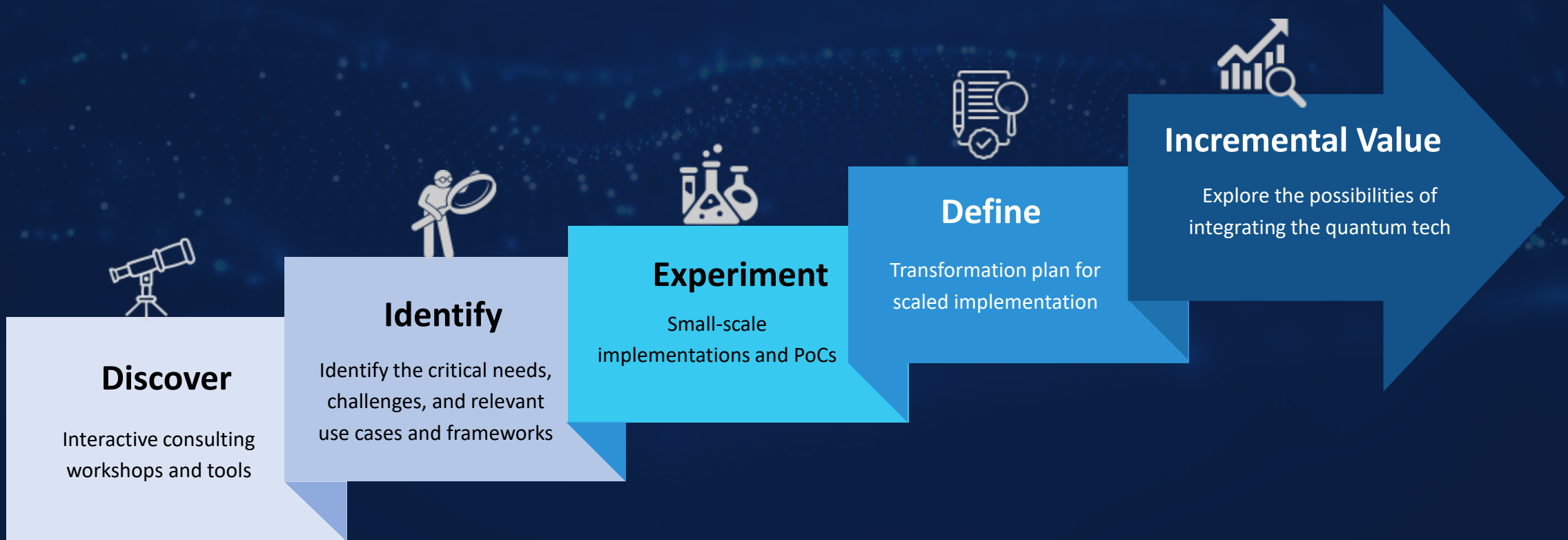- Quantum Safe Communications

Get Quantum Jump Start With LTIMindtree

Enabling Customers to building on the Quantum ecosystem and base models that LTIMindtree has built to give them the Quantum Jump start

Establish Quantum Awareness → **Accelerate Quantum Readiness** → **Initiate Quantum Integration** →

Incremental Value

Explore the possibilities of integrating the quantum tech

Define

Transformation plan for scaled implementation

Experiment

Small-scale implementations and PoCs

Identify

Identify the critical needs, challenges, and relevant use cases and frameworks

Discover

Interactive consulting workshops and tools

Getting to the
future, *faster*.
Together.

LTIMindtree