PQC SYSTEM ENGINEER READINESS

Q-Day | PQC Remediation | Courses & Skills

Presentation

April 29, 2026, Chicago, IL

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Disclaimer

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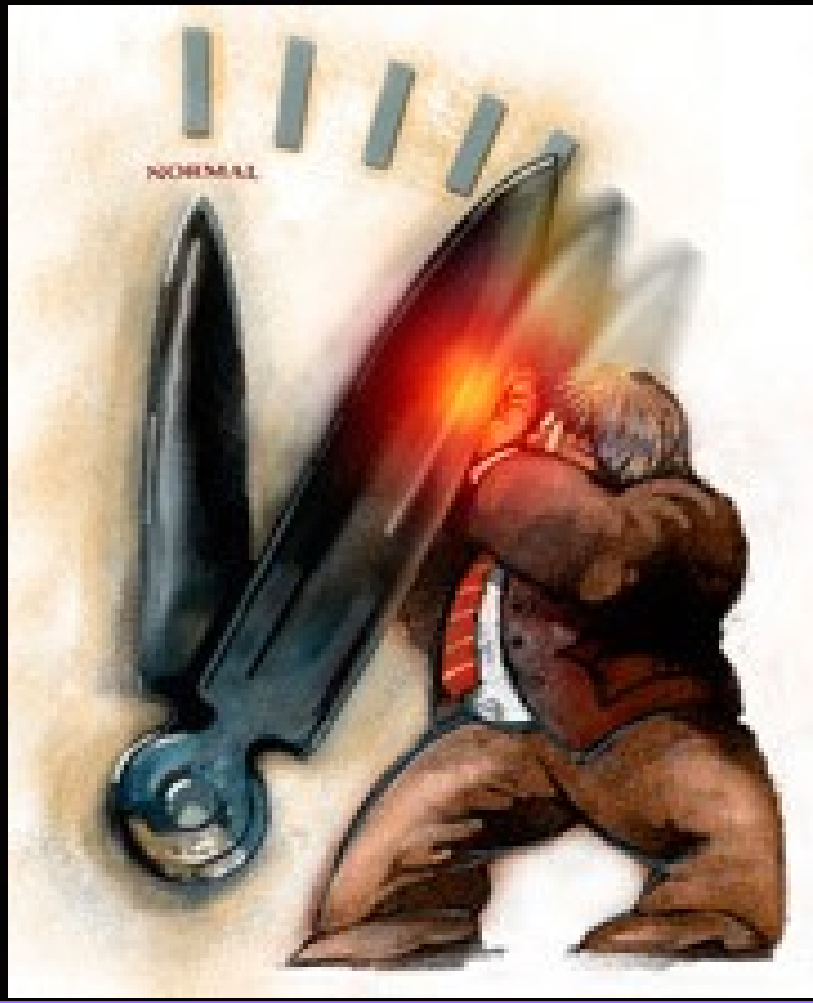
PQC System Engineer Readiness

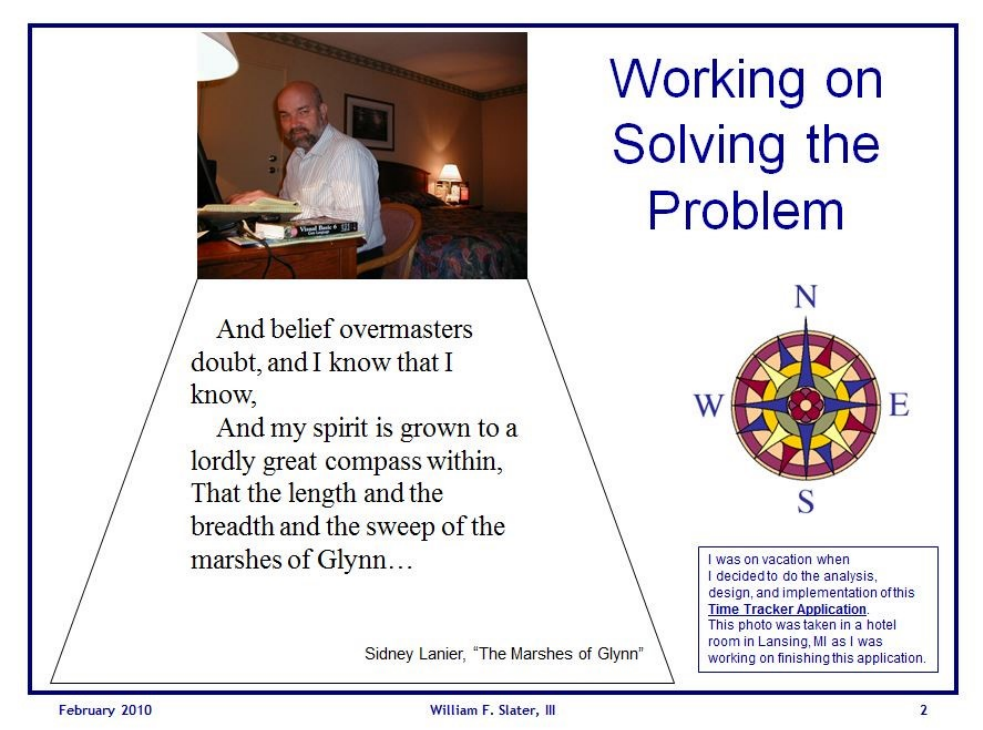
Agenda

- Introduction
- PQC Backgrouund
- How Big Is the Opportunity?
- PQC System Engineer Readiness - Courses and Skills
- Example AI Usage for PQC
- Conclusion
- Questions
- References
- About Me

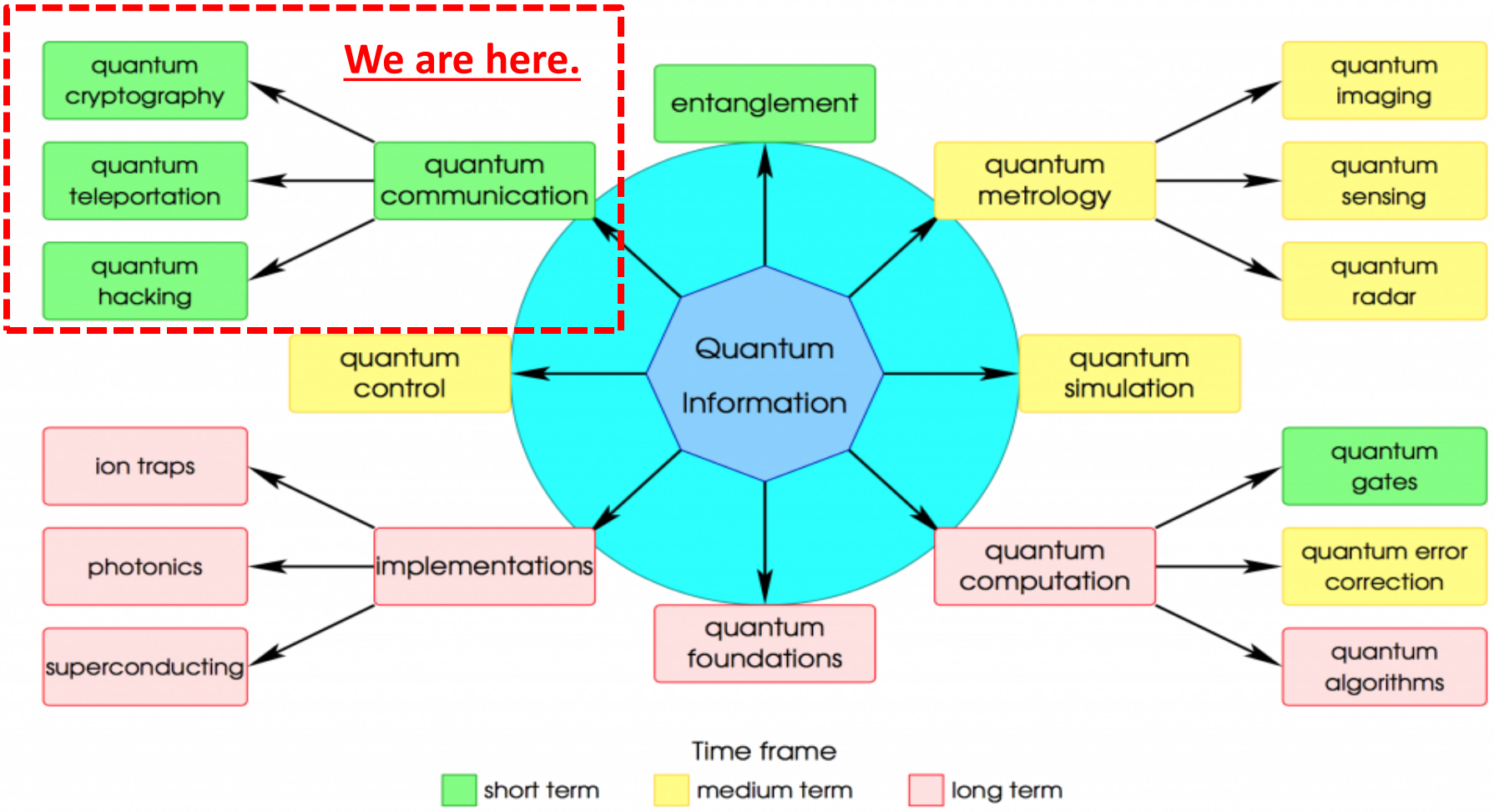


This Presentation Is Readily Available

- PQC System Engineer Readiness (April 2026)
- **https://billslater.com/pqcengineerreadiness2026gopher.pdf**



Enter the Quantum Zone



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Abstract

This brief presentation will introduce the audience to the importance of these topics: Q-Day, Post-Quantum Cryptography Remediation, the Skills required to work on PQC Remediation Projects. What makes these concepts so urgent is that Computer Industry Experts, such as the Google Leadership, are forecasting that Q-Day will arrive by 2029, or perhaps even earlier. There are over 60 billion Internet-connected devices that need to have their cryptographic settings to be reconfigured. The time to act is now, because it is now April 2026 and every day, we get one day closer to Q-Day, when the Bad Guys can have total access to the data that was encrypted with classical, legacy encryption algorithms.

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Introduction

- **PQC, Post-Quantum Cryptography, has risen to the forefront as a crucial topic as people have realized the rapid advancement of Quantum Hardware Development is a reality and that the capabilities and impacts of Cryptographically Relevant Quantum Computers (CRQC) will be considerable.**
- **The algorithm is already there: Shor's Algorithm, a cryptanalytical algorithm developed by Peter Shor at MIT in 1994 will easily break complex ciphers such RSA and ECC when Quantum Computers reach the capability to have the number of Qubits to run the program(s) that have implemented this algorithm. (estimated to be approximately 1 million Qubits).**
- **NIST (National Institute of Standards and Technology – under the U.S. Department of Commerce) has developed Cryptographic Standards that are supposed to be Quantum Safe.**
- **The time to act on PQC Migration Projects is NOW, because the average Enterprise PQC Project takes 3 to 7 years to complete.**
- **We will briefly discuss HNDL and WHY it is a significant problem.**

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What Is PQC?

- **PQC is Post-Quantum Cryptography.**

- **It is a standard that has been developed to withstand efforts by Cryptographically Relevant Quantum Computers (CRQC) to break standard cryptography. NIST is the most prevalent set of PQC Standards, but there are also other standards available in Europe, Japan, China, etc.**

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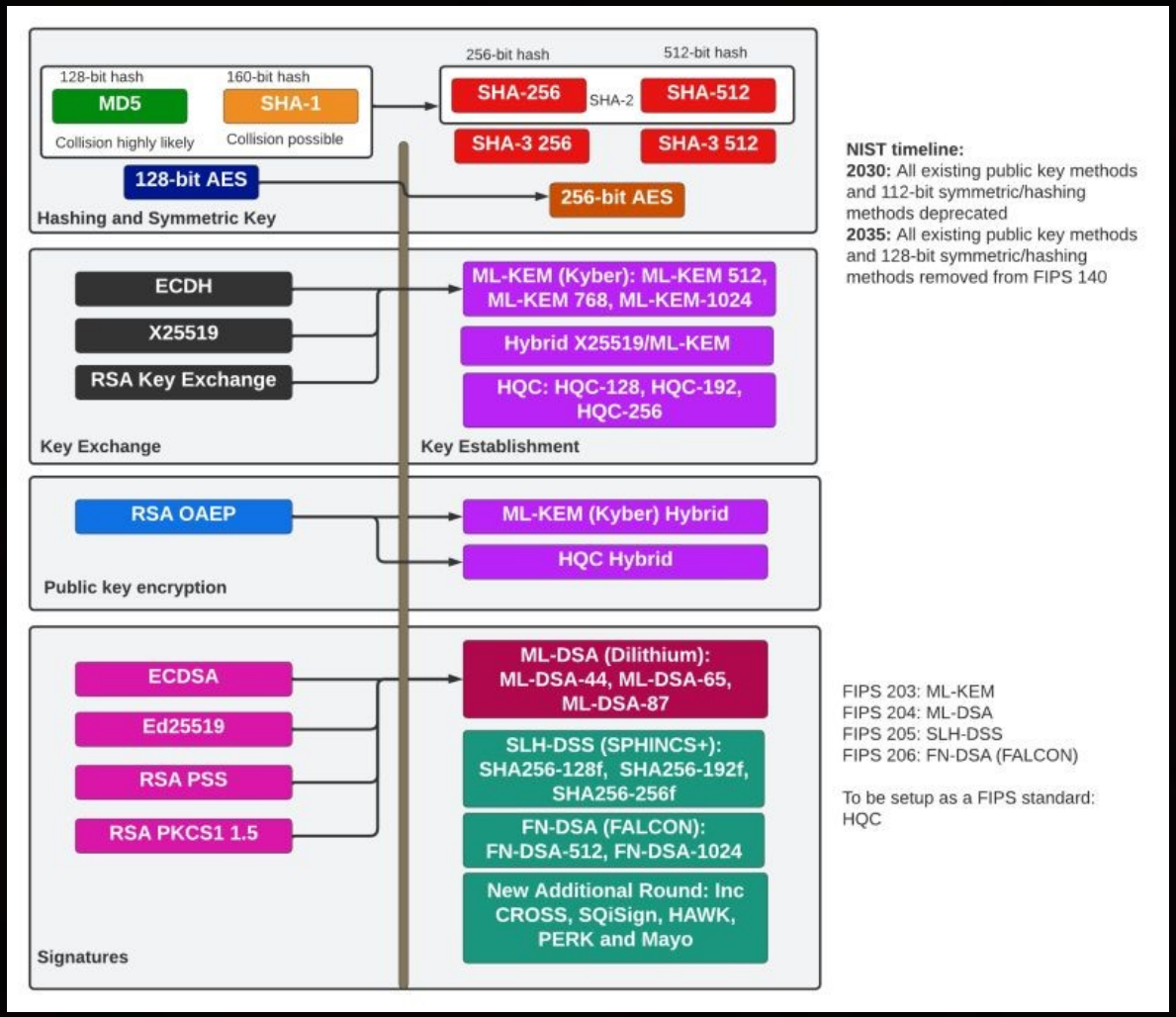
What are we converting?



Source:
Professor Bill Buchanan

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What does PQC Migration Work Like?

It Is Hard to Do. Very, Very Hard!

- **Not "Just Patch OpenSSL":** PQC migration is an enterprise-wide overhaul, touching nearly every system using crypto
- **Analogy - Bigger than Y2K:** Far more complex than Y2K; we have millions of devices, apps, and cloud services all using cryptography
- **Crypto Everywhere:** No system is exempt - OS, apps, databases, IoT, communications, etc. all rely on encryption/authentication

Cover Picture From Technocracy in America, 2016

Slide Source: Mr. Marin Ivezic, 2025.

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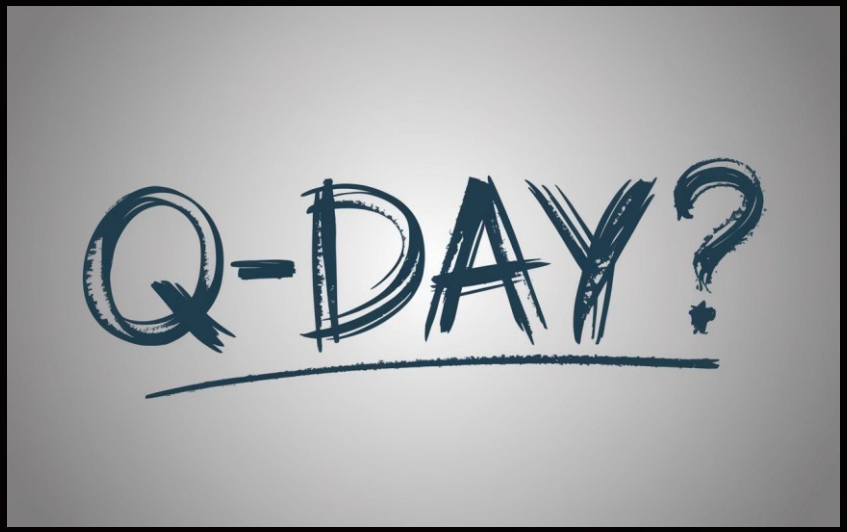
What Is Q-Day?

- **Q-Day is the day when Quantum Computers reach the capacity to easily run programs that have implemented Cryptanalytic Algorithms such as Shor's Algorithm or the GEECM Algorithm.**



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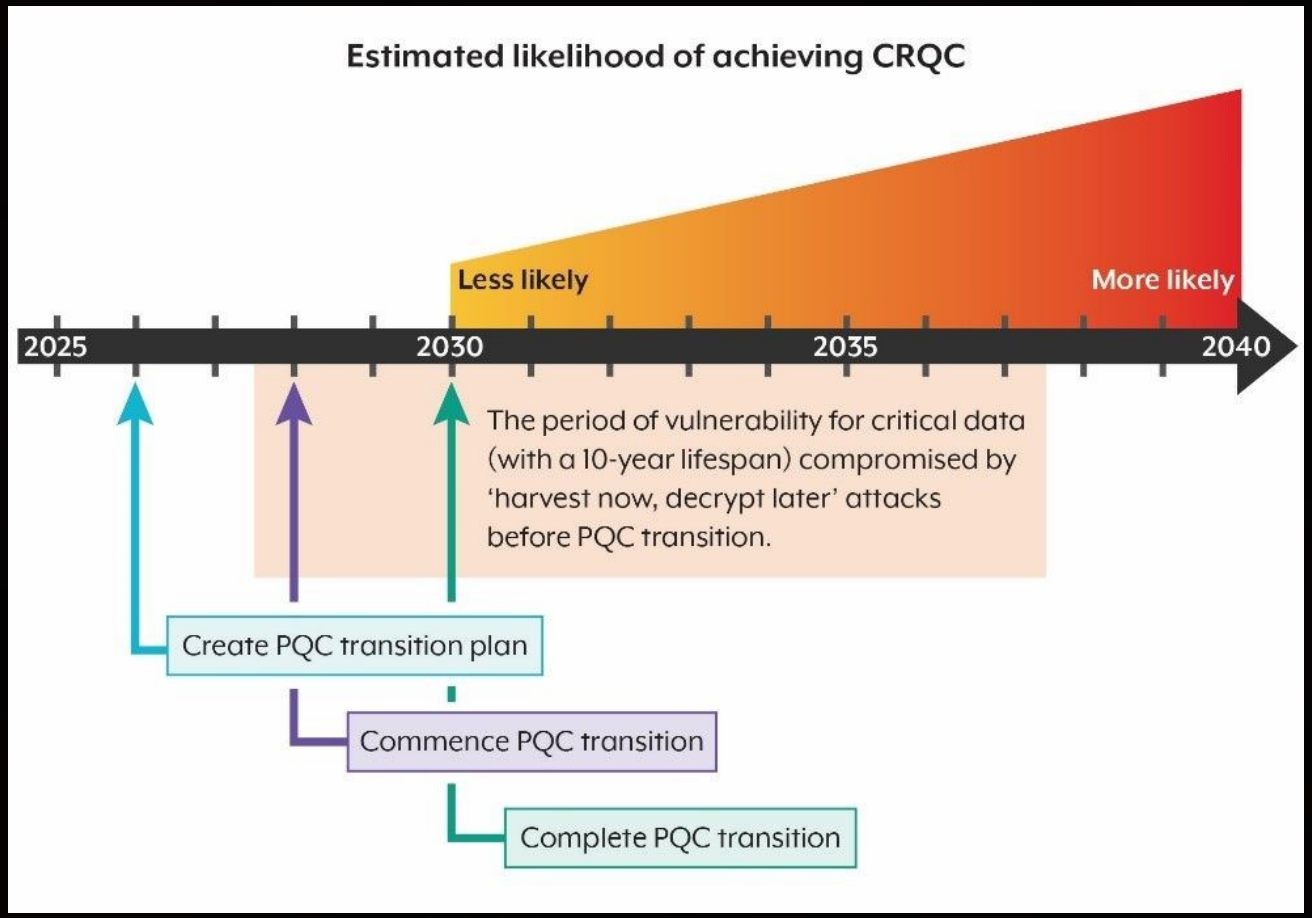
Timeline: Estimated Liklihood of Achieving CRQC (Cryptographically Relevant Quantum Computers)



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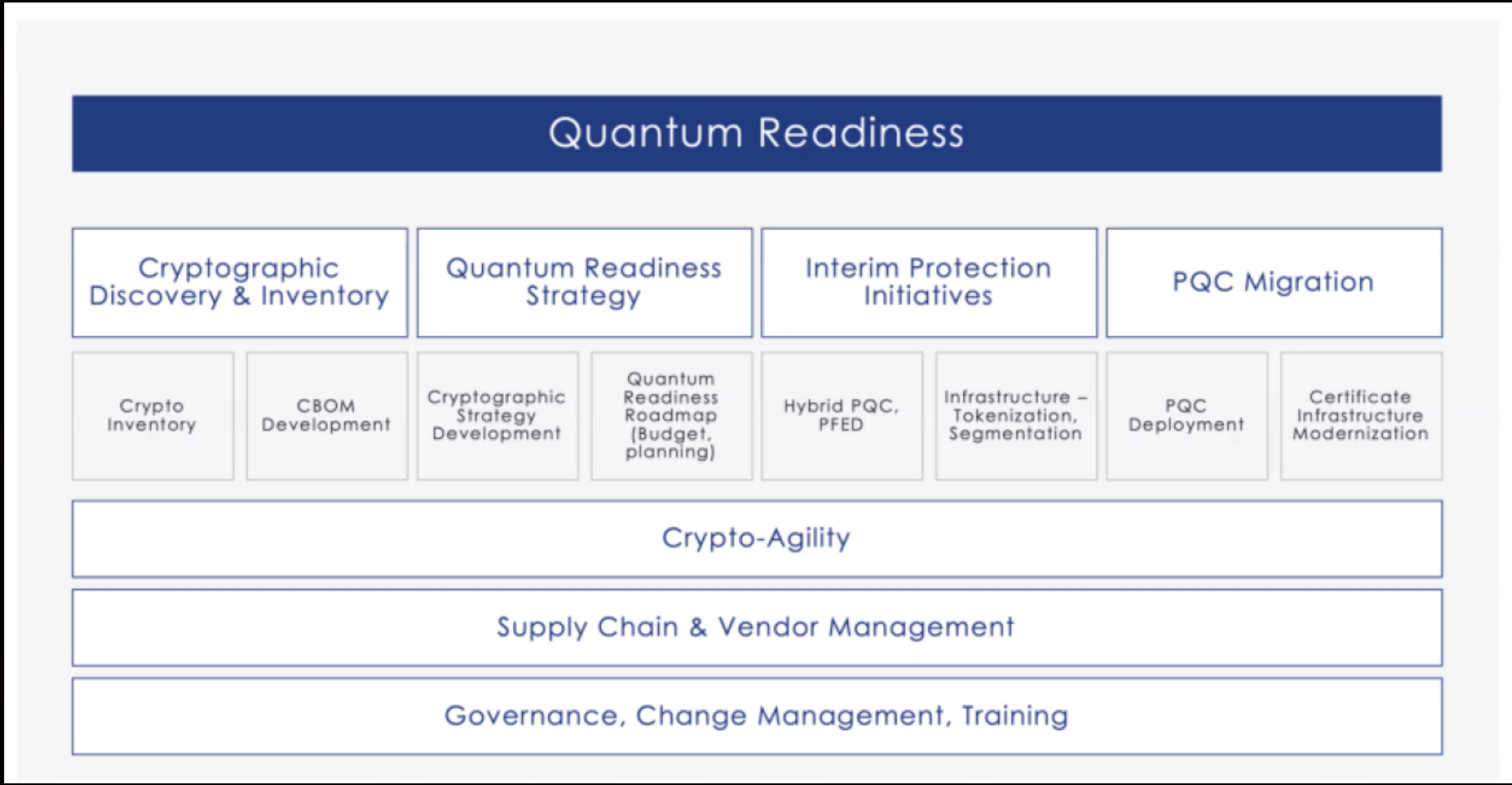
Quantum Readiness



Slide Source: Mr. Marin Ivezic, 2025.

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Forget the Q-Day Predictions – Regulators, Stakeholders & Compliance People

Forget Q-Day Predictions

- Regulators
- Clients
- Insurers
- Vendors
- Investors
- Analysts
- Auditors

...have set up the **deadline of 2030-2035 for quantum readiness**

Slide Source: Mr. Marin Ivezic, 2025.

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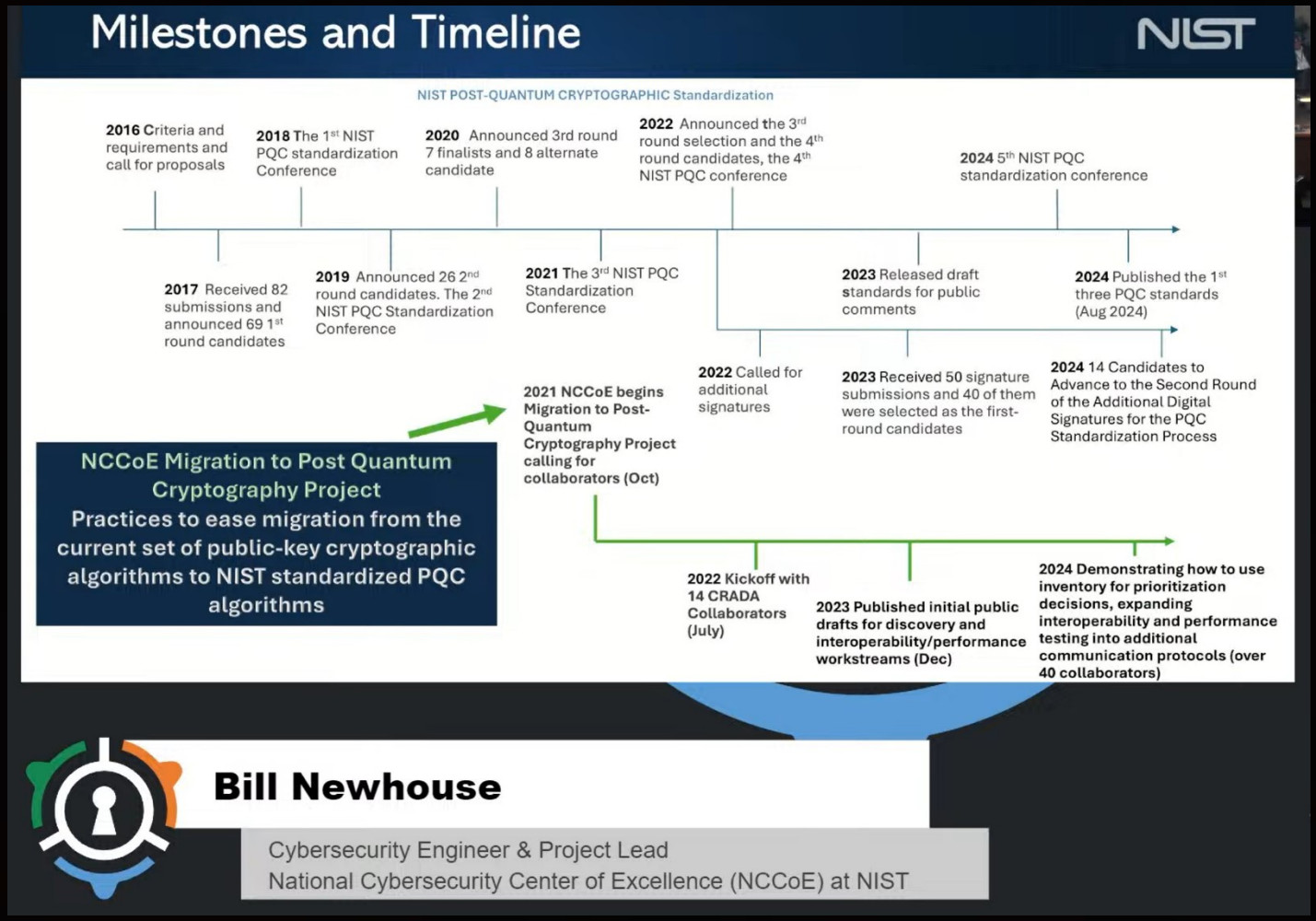
PQC Standards Timeline – Historical Perspective



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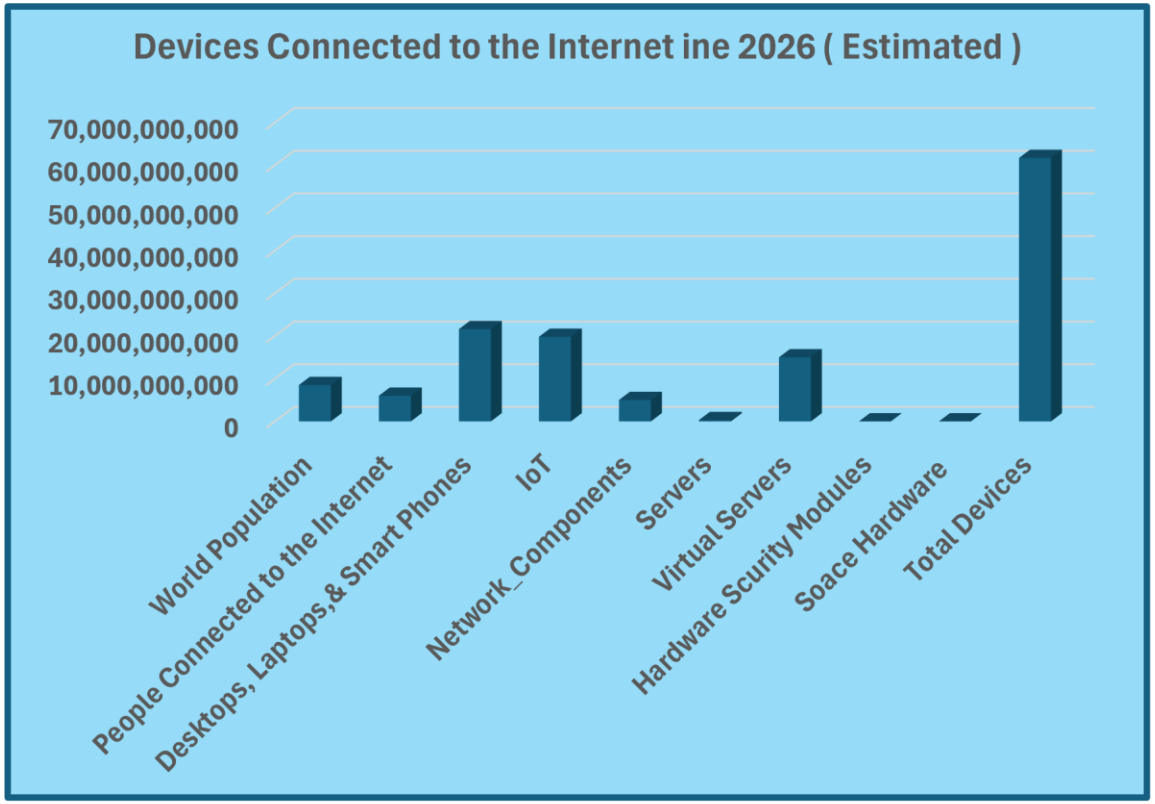
How Large Is This Opportunity?

World Population	8,500,000,000
People Connected to the Internet	6,000,000,000
Desktops, Laptops,& Smart Phones	21,600,000,000
IoT	19,800,000,000
Network_Components	5,000,000,000
Servers	300,000,000
Virtual Servers	15,000,000,000
Hardware Scurity Modules	1,000,000
Soace Hardware	14,000
Total Devices	61,701,014,000

(All figures are estimated)



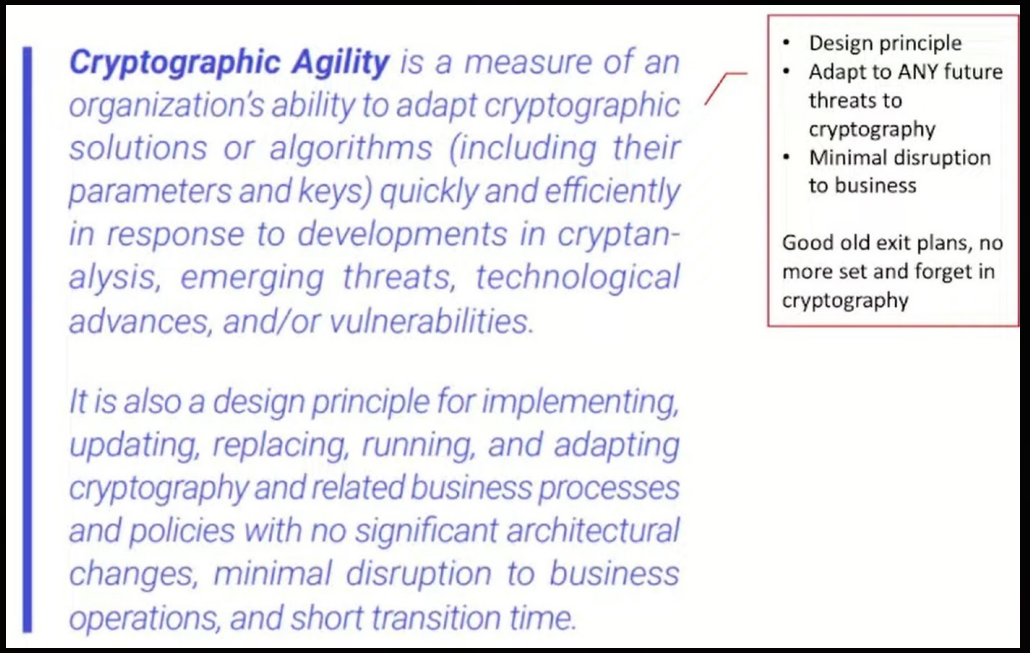
Sunday, April 12, 2026
Chicago, Illinois, USA

PQC System Engineer Readiness – Course and Skills Suggestions

1. Cryptography & PQC Knowledge
2. Systems Engineering & Architecture
3. Security Engineering & PKI
4. PQC Migration
5. Software & Systems Integration
6. Database Skills
7. Networks & Infrastructure
8. Cloud, DevOps, and Automation
9. Compliance & Standards Awareness
10. Testing
11. Custom Tools
12. Risk Management
13. Governance and Compliance
14. Soft Skills

PQC System Engineer Readiness – Course and Skills Suggestions

- All organizations need to be thinking about ***Cryptographic Agility*** RIGHT NOW. In fact, the experts as saying that all initial PQC Migration Projects MUST be coupled with Cryptographic Agility Projects that are conducted simultaneously.
- References:
  - ***RFC 7696*** https://www.rfc-editor.org/rfc/pdfrfc/rfc7696.txt.pdf
  - ***Becoming Quantum Safe***, by Jai Singh Arun, Ray Harishankar, and Walid Rjaiibi, 2025



Source: NIST at the PCI Consortium Conference January 2025.

PQC System Engineer Readiness – Who Will Do This Work?

The Potential American Worker Pool Demographics

Generations in America			
Generation	**Time Frame**	**Age Now**	**Size (Millions)**
The Silent Generation	1928-1945	79-96 years old	**50**
Baby Boomers	1946-1964	60-78 years old	**76**
Gen X	1965-1980	44-59 years old	**54**
Millennials	1981-1996	28-43 years old	**96**
Gen Z	1997-2012	12-27 years old	**103**
Gen Alpha	Early 2010s-2025	0-approx. 11 years old	**In Progress**

Note: 2.8 million born / week - set to be the largest American Generation in History

As of March 28, 2024, there have been 636 weeks since January 2011

So 178,100,000 ?
Is this even possible?

The US Census in 2020 showed about 330 million people in the U.S.

Compiled by: William Favre Slater, III

3/28/2024

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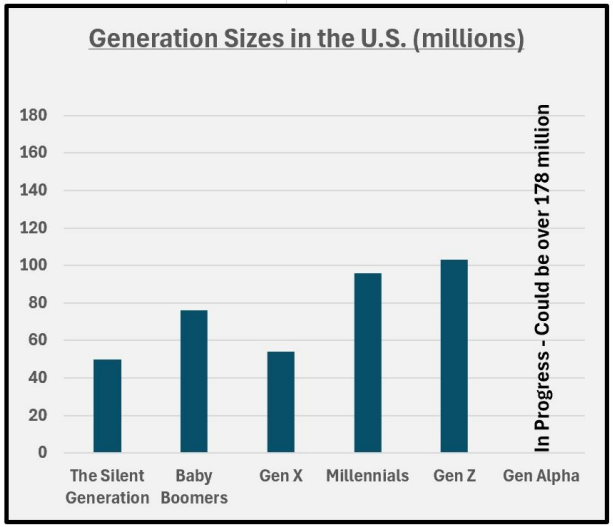
Chicago, IL

United States of America

Sources: MentalFloss.com and Exploding Topics

https://www.mentalfloss.com/article/609811/age-ranges-millennials-and-generation-z

https://explodingtopics.com/blog/generation-alpha-stats#top-gen-alpha-stats



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How Will We Get This PQC Migration Work Accomplished?

- Talented, Trained, Dedicated Engineers and Managers
- Automation Tools
  - Discovery
  - Replacement
  - CBOM and SBOM Maintenance
  - Verification
  - Continuous Testing
- AI

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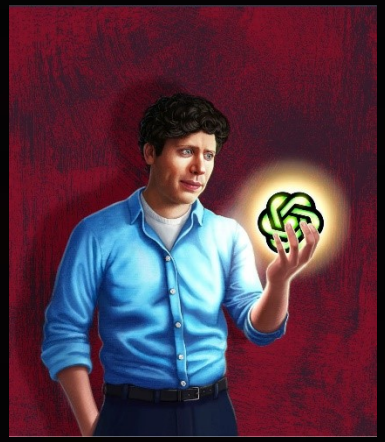
An AI PQC “ Gift “ from William Slater and Sam Altman



Copy and Enter This Prompt into ChatGPT at https://chatgpt.com

Please provide detailed remediation steps to deal with Harvest Now Decrypt Later in an MS Word document. Please include a PQC Migration Architecture Diagram, a Crypto Discovery Playbook, Executive Briefing Slides, a CISO HNDL Threat Model Diagram, Enterprise PQC Migration Reference Architecture (detailed engineering diagram), a Crypto Asset Discovery Automation Toolkit, a Hybrid PQC TLS Architecture Diagram, and an Enterprise PQC Migration Program Plan (5-year roadmap). Please package these into a complete PQC Migration Program Toolkit (Word + PPT + Excel).

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An AI PQC " Gift " from William Slater and Sam Altman

PQC Migration Program Toolkit Workbook

Sheets

Roadmap	5-year migration plan with owners, timing, and status controls
CBOM_Template	Cryptographic asset inventory template with scoring formulas
Discovery_Toolkit	Automation controls and implementation patterns
Risk_Register	Executive risk register with priority calculations
Dashboard	Program metrics fed by other sheets

Color legend

Blue text	User inputs / variables
Black text	Formulas / derived values
Green text	Linked/imported references
Gray text	Static constants
Orange fill	Review / caution
Light red fill	High risk / issue
Purple text	Control / logic
Teal text	Key KPI / dashboard anchors

Read Me | Roadmap | CBOM_Template | Discovery_Toolkit | Risk_Register | Dashb

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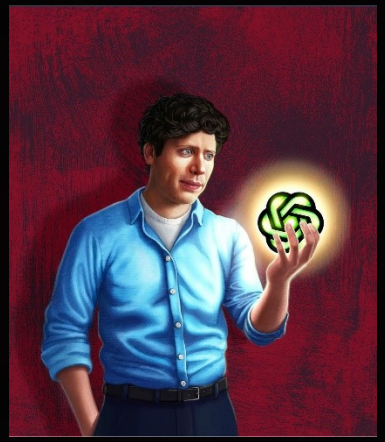

Copy and Enter This Prompt into ChatGPT at https://chatgpt.com

Create a Work Breakdown Structure Diagram and a Work Task List and a Schedule, for a PQC Migration Project that will remediate Quantum Vulnerability Cryptography issues in an organization that has 10,000 laptops, 3,500 servers, 3,000 network devices, and 6,000 IoT devices, all of which are connected to the Internet. This project is expected to last 5 years. Please include a WBS Diagram, a detailed resource loaded Gantt Chart, a Milestone List. a Deliverables List, a PQC Migration Architecture Diagram, a CBOM Database Design, a Budget Estimate, a Staffing Plan, a Risk Register, a Individualized Training Plan for each Job Category on the Staff., and a 5-Year Crypto Agility Roadmap.

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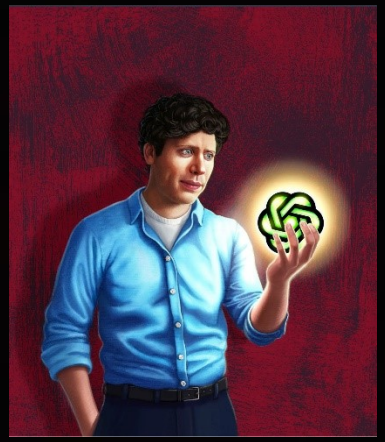
An AI PQC “ Gift “ from William Slater and Sam Altman



Copy and Enter This Prompt into ChatGPT at https://chatgpt.com

Please create a quantum circuit diagram for a 25-Qubit Quantum Computer depicting Shor’s algorithm and write the results to jpg file.

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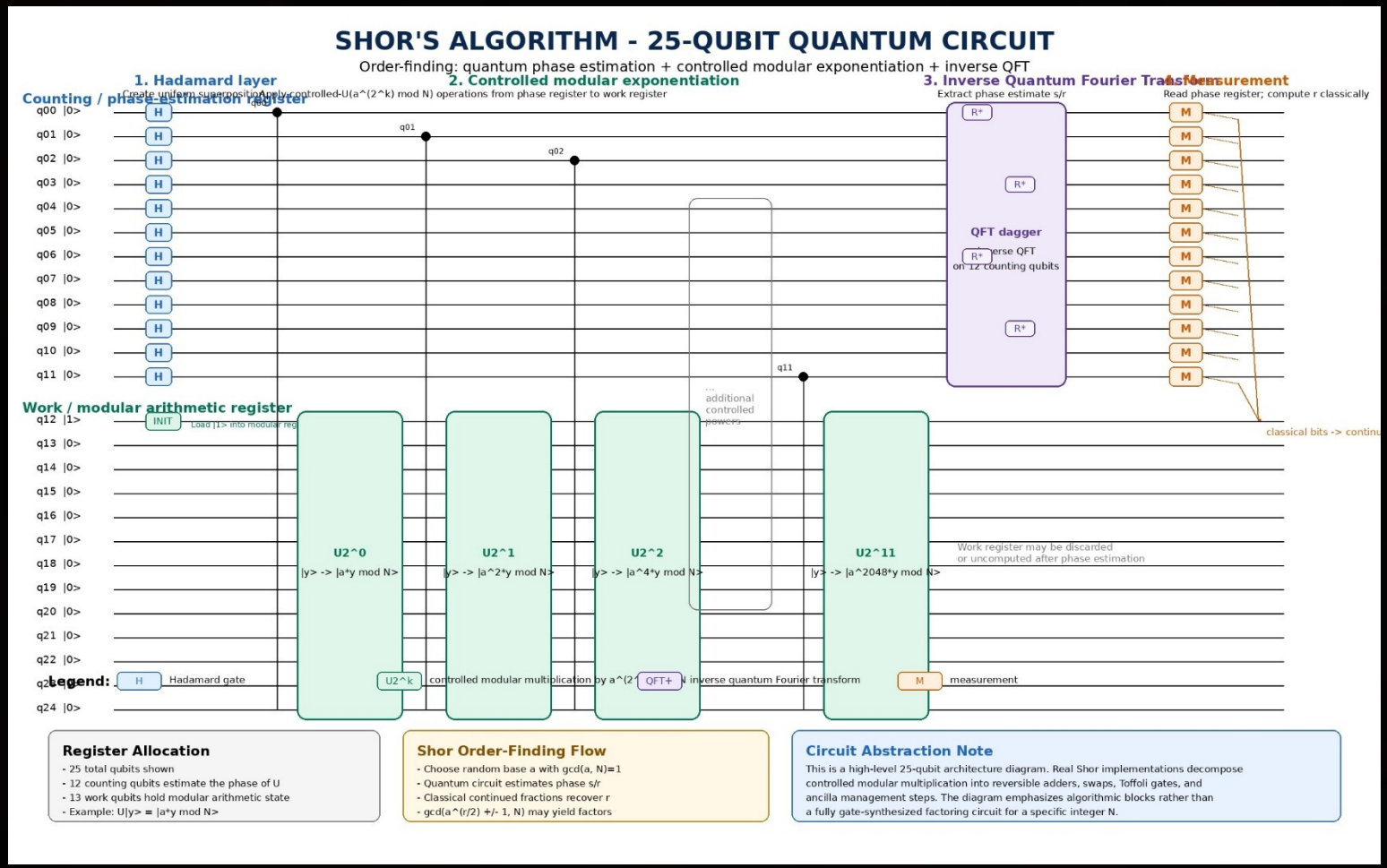
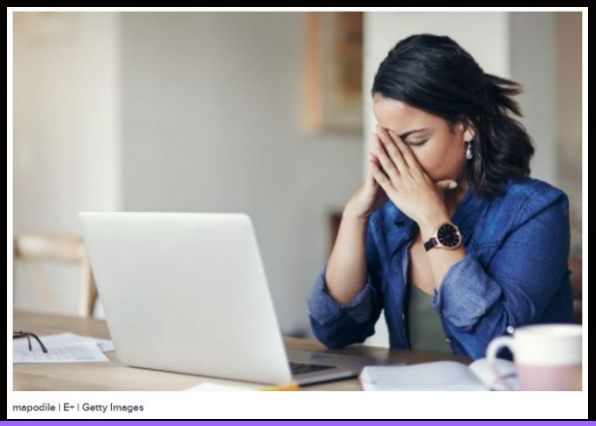
An AI PQC “ Gift “ from William Slater and Sam Altman



PQC System Engineer Readiness

Two Very Dirty Secrets

- **How Networked Computers Communicate**
  - They transmit electronic messages whether cryptography is present or not, and whether is configured properly, or not.
- **Harvest Now, Decrypt Later (HNDL) is a very cruel, harsh reality.**
  - You can accomplish a perfect PQC Migration project and still be incredibly vulnerable, because of PAST network communication activity using vulnerable legacy encryption. (I wish this was not true, but it is TRUE.)
  - No one, yet, has a viable solution to this issue.

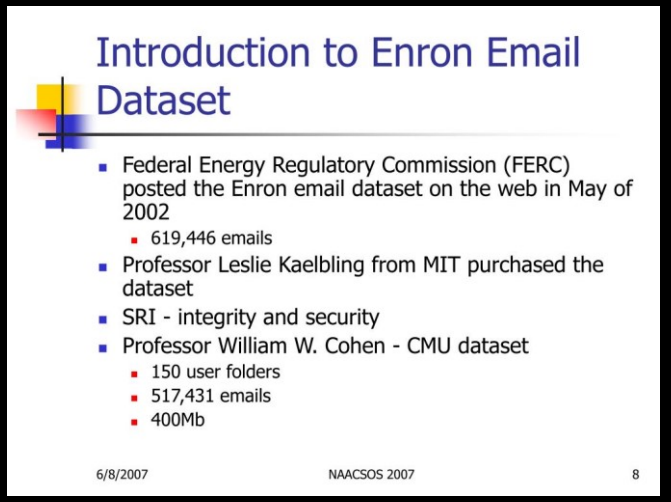


What Is Harvest Now, Decrypt Later? (HNDL)

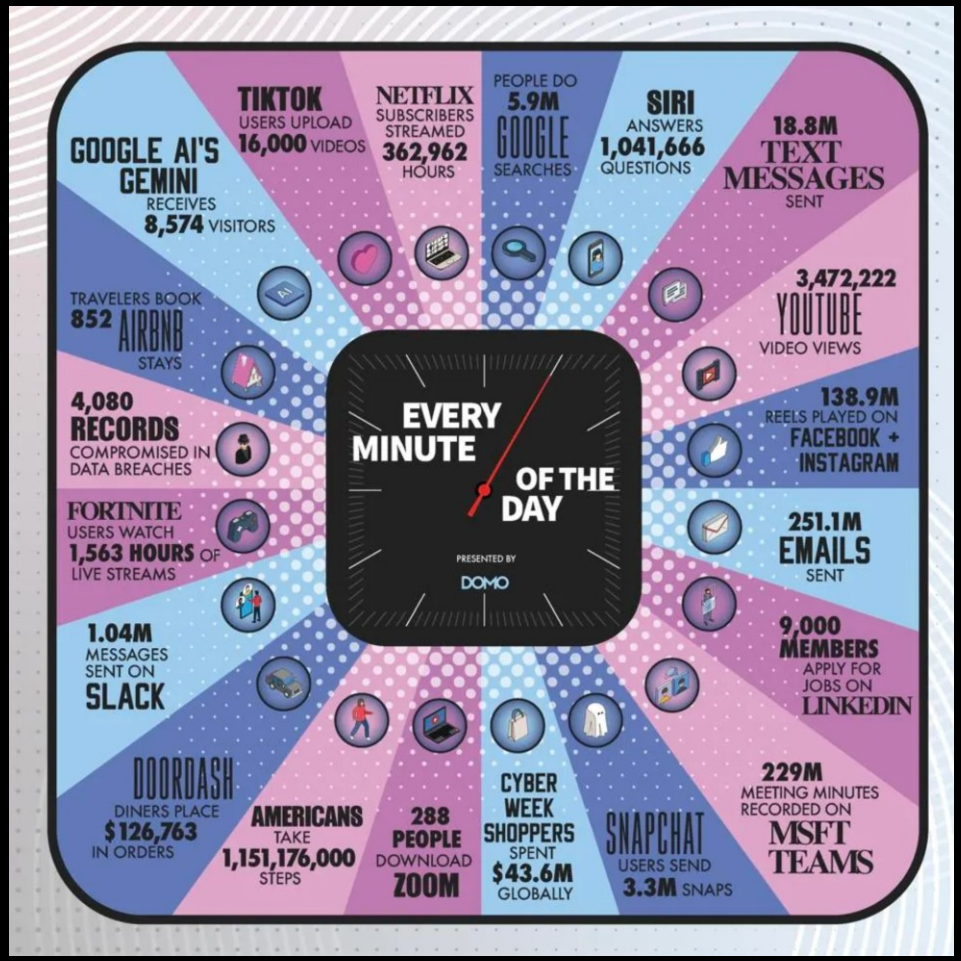
- Data that traverses the Internet is usually encrypted.
- The Bad Guys and Nation States are capturing and storing this data that is encrypted using older encryption algorithms.
- Between 2028 and 2030, when CRQC computers become commonplace, the harvested data can be decrypted at the time and place of the Bad Guys' choosing and they use this decrypted data to their advantage.
- Note that the decrypted data can also be data that belongs to organizations that have completed their PQC Migrations, because the harvest data was encrypted using olded algorithms that are vulnerable to cryptoanalytic attacks of Quantum Computers.

What Is Harvest Now, Decrypt Later? (HNDL)

- When Q-Day occurs, data that has been encrypted and captured will be at risk. This risk is known as " Harvest Now Decrypt Later ".
- Do an Internet Search on " ***Enron Email Dataset*** " and also " *Peter Attia Epstein* " and you will understand the akward situations involving unintend releases of data that was previously thought to be CONFIDENTIAL and PROTECTED.



Internet Minute - 2025



Note:
Multiply these Nunbers by 525,600 minutes and you will begin to understand the quantity of data that is carried by the Public Internet every year.

Source:
https://bondhighplus.com/blog/what-happens-in-an-internet-minute/

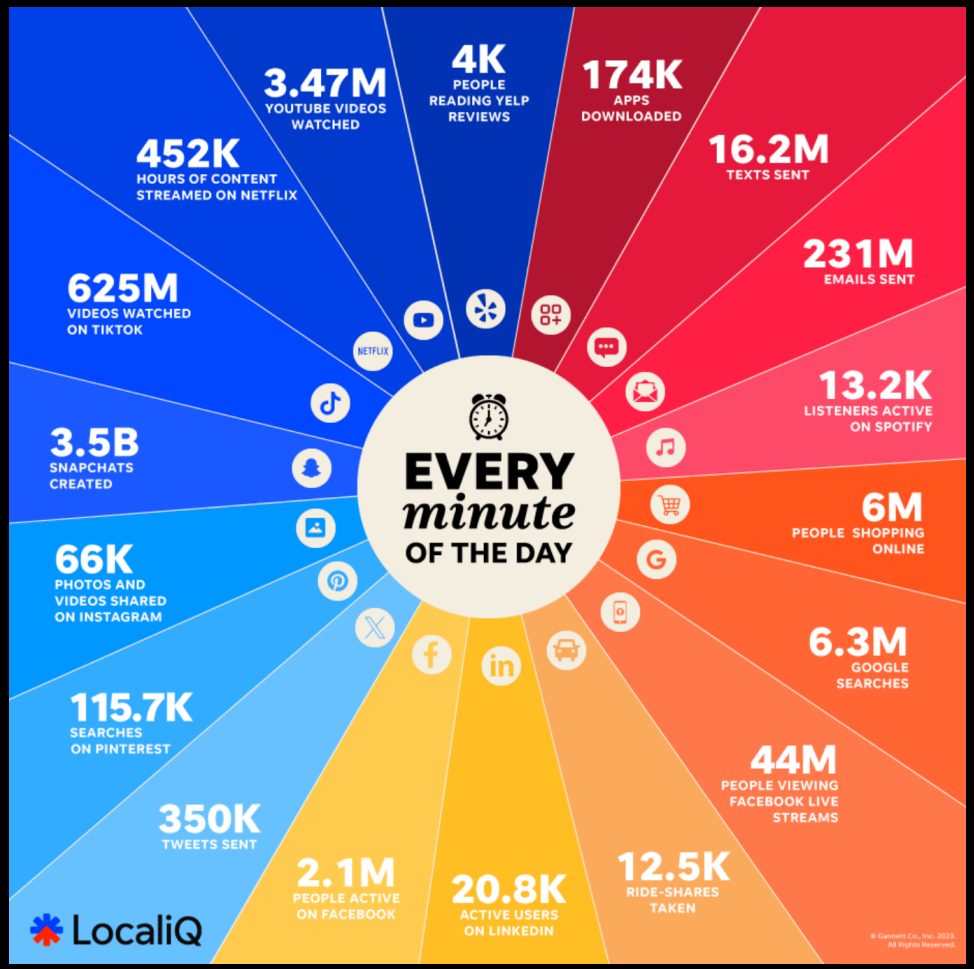
Internet Minute – 2015 to 2025

Year	Emails Sent	Google Searches	YouTube Views	TikTok Views	Online Spend	App Downloads	Instagram Activity
2025	231M+	6.3M+	3.47M	625M videos watched	$43.6M+	174K	66K photos shared
2024	231M	6.3M	3.47M	625M videos watched	$43.6M (peak minute)	174K	66K photos shared
2023	231M	5.9M	3.67M	167M videos watched	$1.5M+ (est.)	174K	694M songs streamed
2022	231M	5.9M	508 hrs uploaded	1B+ interactions	$443K (Amazon only)	437K transfers	527K photos shared
2021	225M (est.)	5.7M (est.)	5.0M (est.)	167M (est.)	$1.3M (est.)	450K (est.)	800K (est.) scrolling
2020	190M	4.1M	4.7M	N/A	$1.1M	400K	694K scrolling
2019	188M	3.8M	4.5M	N/A	$996K	390K	347K scrolling
2018	187M	3.7M	4.3M	N/A	$862K	375K	174K scrolling
2017	156M	3.5M	4.1M	N/A	$751K	342K	46K posts uploaded
2016	150M	2.4M	2.78M	N/A	$203K	51K	527K photos shared
2015	204M	2M+	1.3M	N/A	$83K	47K	3,000 uploads

Source:
https://bondhighplus.com/blog/what-happens-in-an-internet-minute/

Internet Minute - 2025

Note:
Multiply these Nunbers by 525,600 minutes and you will begin to understand the quantity of data that is carried by the Public Internet every year.



Source:
https://localiq.com/blog/what-happens-in-an-internet-minute/

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Conclusion

- We have presented a list of the Courses that will equip the PQC System Engineer to be a star performer on PQC Migration Projects.
- Q-Day is a reality, and unlike Y2K when we knew the deadline was December 31, 1999, we don't know the exact date. Many believe it will occur between 2028 and 2031.
- Regulators and Compliance Organizations are mandating the requirements to get these projects dome.
- These projects are not easy and require time and effort by experts. Work with experts to get it done.
- Start now. Procrastination is three issues:
  - You may not finish before Q-Day.
  - The longer you wait, the more expensive it will get.
  - Regulatory issues may incur fines and in worst case, prison time.
- HNDL is the kind of technology problem that should have us ALL worried.

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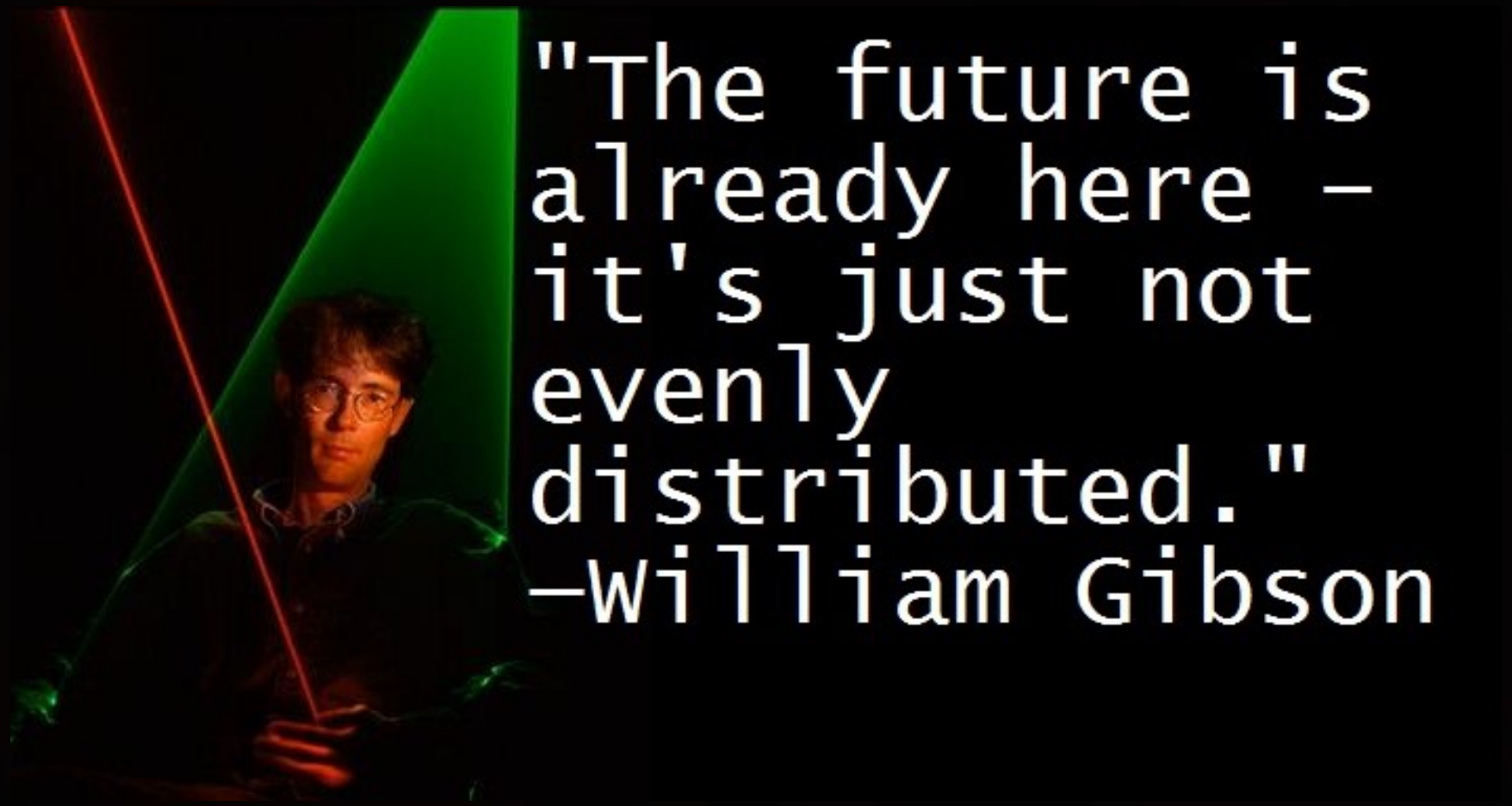
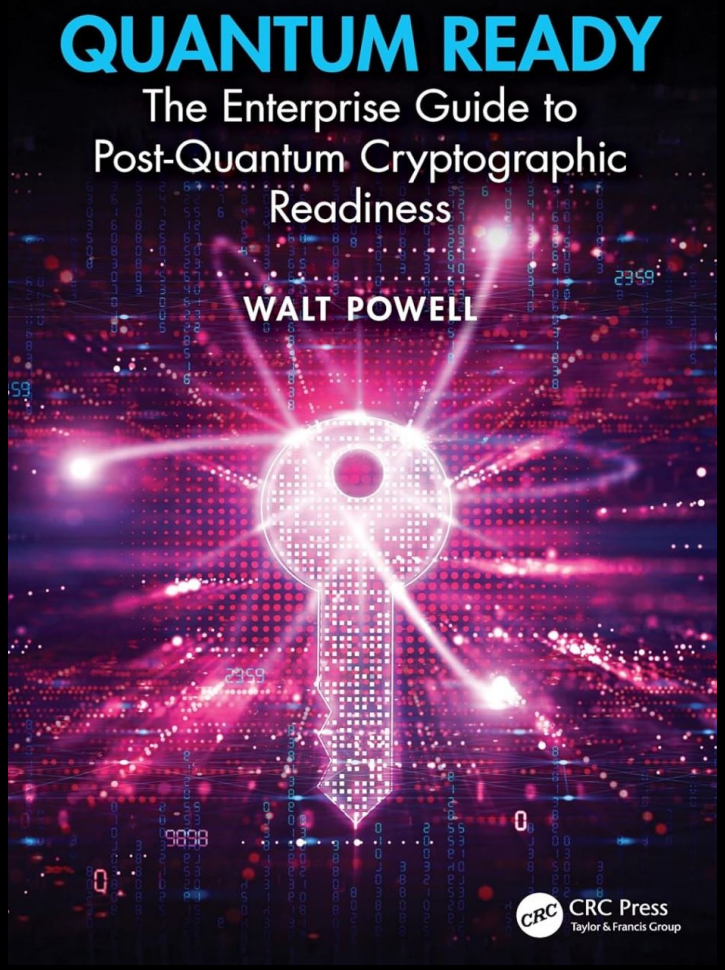
Conclusion

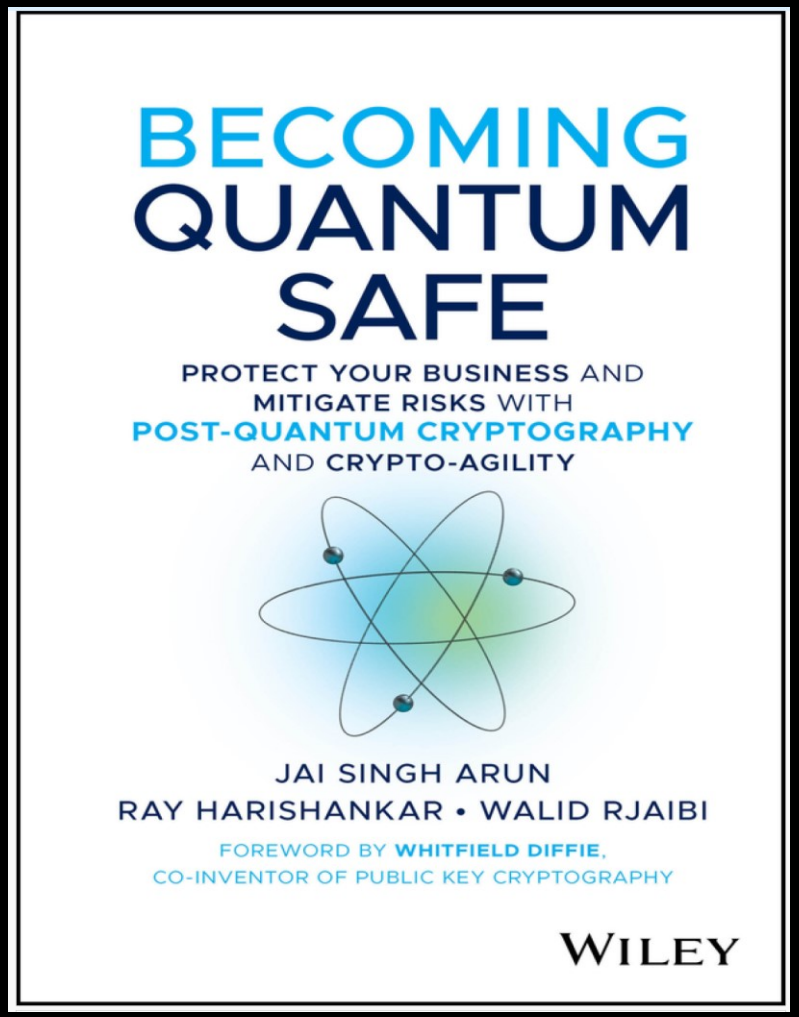


PQC System Engineer Readiness

Important PQC References



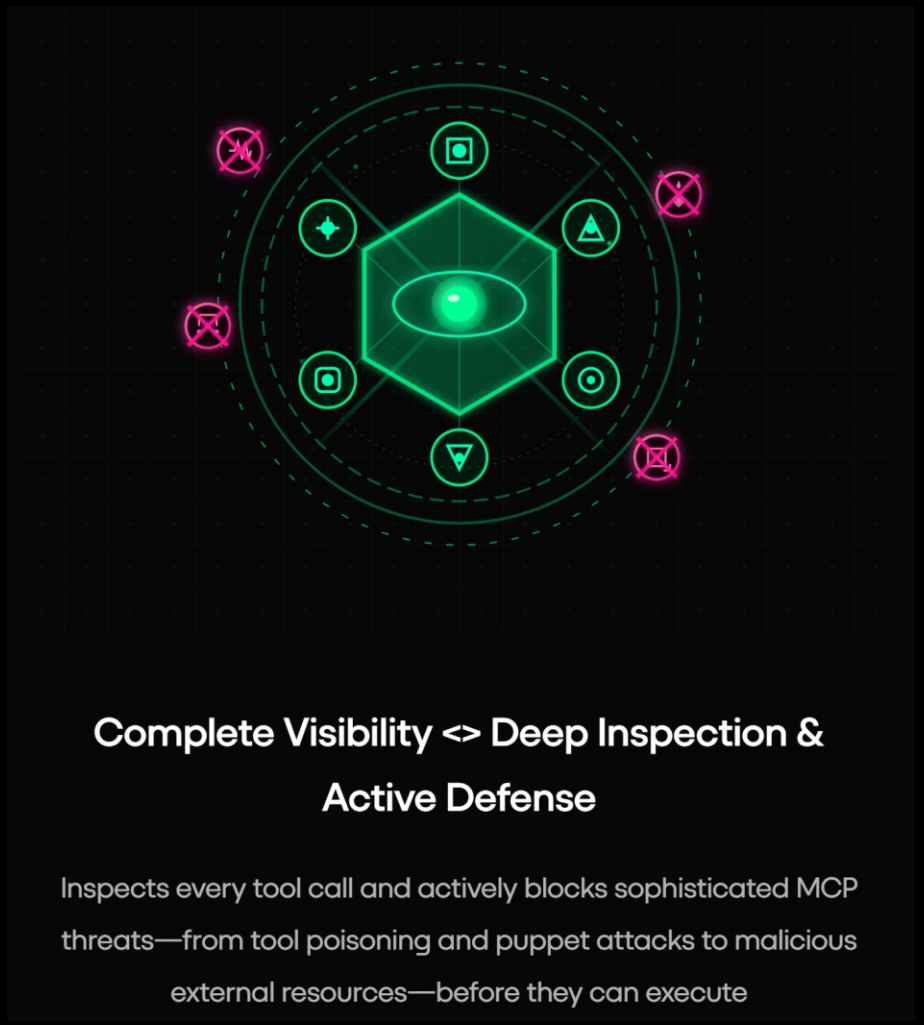
Published February 2026



Published September 2025

Parting Message from Our Sponsor

Gopher Security



Parting Message from Our Sponsor

Gopher Security

QUANTUM-SAFE NETWORKING / PILLAR 01

Gopher Microsegmentation

Identity-bound, peer-to-peer access — every workload becomes its own perimeter.

Identity-First Segmentation

Every connection is brokered by cryptographic identity — not IP, VLAN, or firewall rule. Lateral movement is structurally impossible.

Workload-Level Granularity

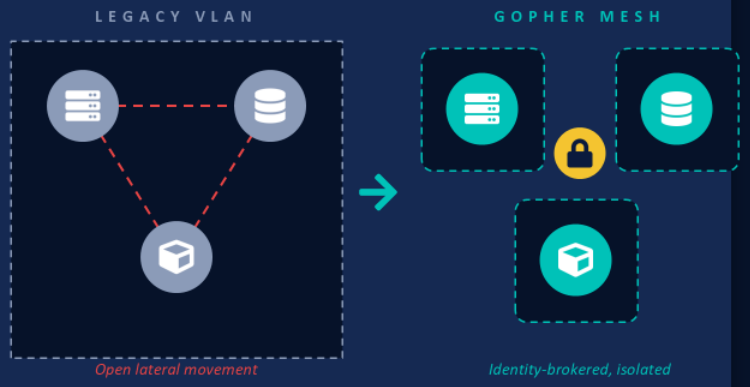
Policies attach to the asset, not the network. A single workload, container, or service can be isolated independently of its host environment.

Quantum-Resistant by Default

ML-KEM key exchange and ML-DSA / Falcon signatures protect every segment — no upgrade path, no future migration project.

LEGACY VS. GOPHER

Architectural shift



BUSINESS OUTCOME

Blast radius collapsed to a single workload — breach containment without re-architecting the network.

GOPHER SECURITY Quantum-Safe Networking | Confidential 01 / 02

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Gopher Security

QUANTUM-SAFE NETWORKING / PILLAR 02

Layer-3 Tunneling — No Rip-and-Replace

Drop quantum-safe transport over your existing network — without touching applications, firewalls, or routing.

ENCRYPTED L3 OVERLAY / EXISTING INFRASTRUCTURE PRESERVED

EXISTING IP / MPLS / SD-WAN — UNCHANGED

Quantum-safe Layer-3 overlay

DATA CENTER
On-prem workloads

ML-KEM + ML-DSA

BRANCH / EDGE
Remote sites & users

< 7 days
TIME TO DEPLOY
Software-only overlay — no hardware refresh, no application rewrites.

Zero
APP CHANGES
Operates beneath the application layer. Legacy stacks and protocols pass through transparently.

100%
INFRA REUSE
Runs over existing IP, MPLS, SD-WAN, and public internet. No vendor lock-in to a specific transport.

Day-1
PQC PROTECTED
ML-KEM key exchange and ML-DSA / Falcon signatures from first packet — HNDL threat neutralized.

BUSINESS OUTCOME

Quantum-safe by next quarter — not next decade. Capex preserved, audit posture advanced.

GOPHER SECURITY Quantum-Safe Networking | Confidential 02 / 02

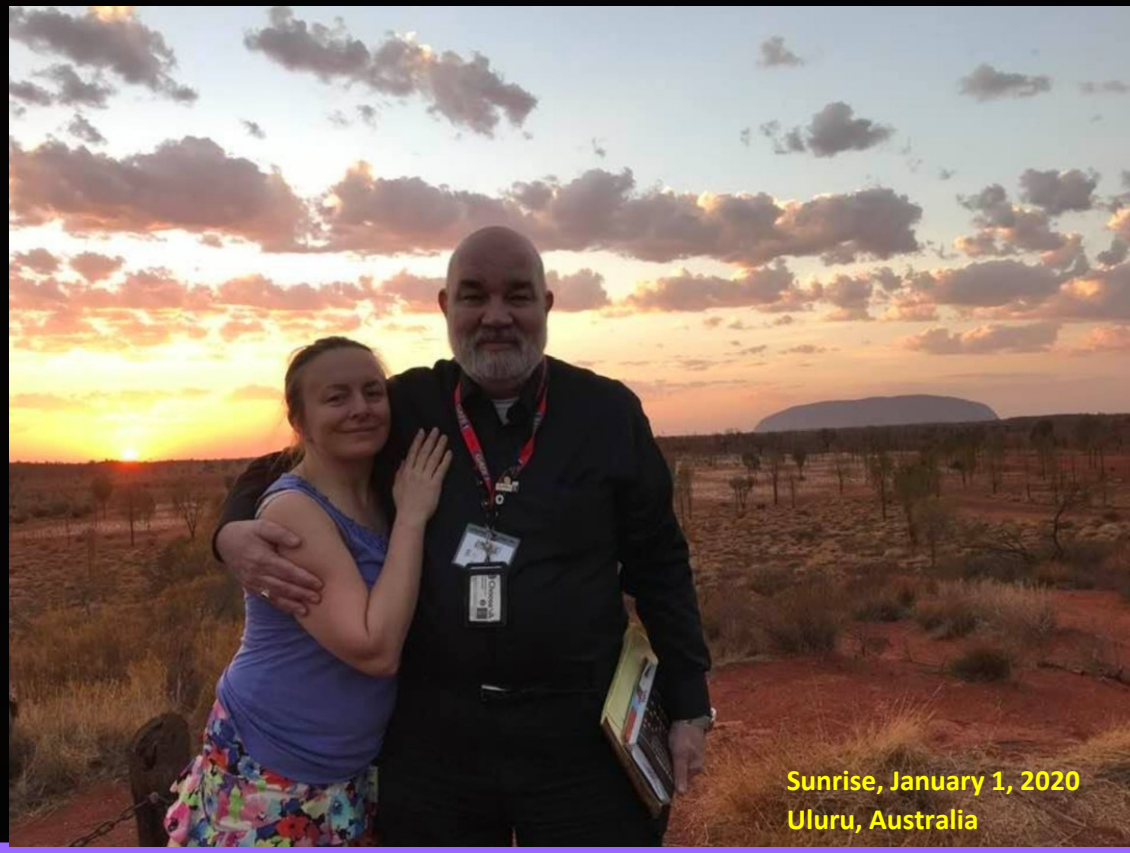
PQC System Engineer Readiness

Questions and Answers

PQC System Engineer Readiness

About Me

1. E-Mail williamslater @ gmail.com
2. Phone 1-312-342-2626
3. CEO and owner of Slater Technologies, Inc. (since 1989)
4. In Quantum since 2011
5. PQC training and Projects since January 2025
6. Started in Cybersecurity in the U.S. Air Force: 1977.
7. Former U.S. Air Force Computer System Staff Officer who served at Strategic Air Command HQ.
8. Programming Languages: 43
9. 3 Graduate Degrees
   - MS Computer Information Systems
   - MBA
   - MS Cybersecurity
10. 88 Certifications including CISSP, SSCP, CISA, PMP.
11. Certified Project Manager with over 25 years experience.
12. Born and Raised in Memphis, Tennessee
13. Lives and works in Chicago, Illinois, USA
14. Published Author: https://billslater.com/writing
15. Working with QSECDEF since September 2024.
16. Happily married to Joanna Roguska since December 2000.
17. Actively working on PQC Migration Projects
18. Avid fan of Andreas Vollenweider Music (since 1985), Chess (since 1964), and Judo (since 1968).
19. Voracious Reader with 18,000 physical books and 8000 digital books.
20. Meyers-Briggs: INFP.
21. Non-Denominational Christian (since 1973).



Sunrise, January 1, 2020
Uluru, Australia

Supplemental Slides

Q Day is the finish line for PQC readiness

WIRED

HAPPY Q-DAY

Warning: It'll be the worst holiday in the history of the world.

Contents

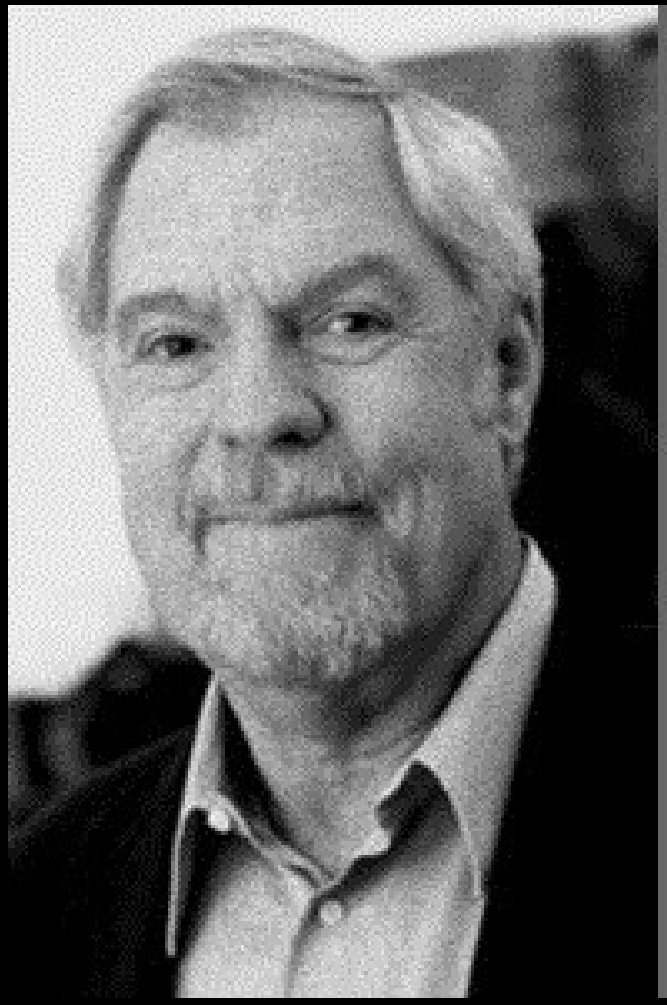
BY AMIT KATWALA

ILLUSTRATIONS BY NICHOLAS LAW

Stockdale Paradox

You must never confuse faith that you will prevail in the end -- which you can never afford to lose -- with the discipline to confront the most brutal facts of your current reality, whatever they might be.

Admiral James B. Stockdale



"One of life's most painful moments comes when we must admit that we didn't do our homework, that we are not prepared."

Merlin Olsen

I have learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.

Maya Angelou
1928-2014

Photo by Michael Collopy

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Enter the Quantum Zone

Join Our QSECDEF Group Meeting Every Tuesday

3 PM Paris Time, 2 PM UK, 9 AM New York, 8 AM Chicago, 2 AM Wed. Australia

Event Link on Zoom, CLICK HERE:
https://zoom.us/j/91478584384

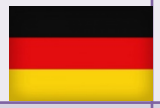
FREE QSECDEF (Australia) Group Meeting Every Monday

12:00 Noon, NSW Australia (contact Muria.Roberts@protonmail.com for more information)

https://us06web.zoom.us/j/81330899720

FREE Quantum Group Meetings

QSECDEF - Germany & France - Meets Weekly, every Tuesday
Event Link: https://zoom.us/j/91478584384
Event Date and Time - Tuesday, April 7, 2026
15:00 CEST / 14:00 UK / 09:00 EST / 08:00 CST / 02:00 Wednesday - Australia
Steve Vaile is the Director. steve@qsecdef.com



Australia
QSECDEF Australian Quantum Group - 9:00 Central Time, every Sunday . It's 12:00 Noon Monday in Australia
https://us06web.zoom.us/j/81330899720
Meeting ID: 813 3089 9720
Wonderful People, and Great Presentations!
Muria Roberts is the Director - Muria.Roberts@protonmail.com

Chicago Quantum Meetup - Monthly Meetings
https://www.meetup.com/chicago-quantum-computing-meetup-group-revival/
Registration required - Meetup
Do an Internet Search - Chicago Quantum Meetup. Sometimes they have 1 to 0 meetings per month.
Barry Burd and Ron Schreiner are the Directors.

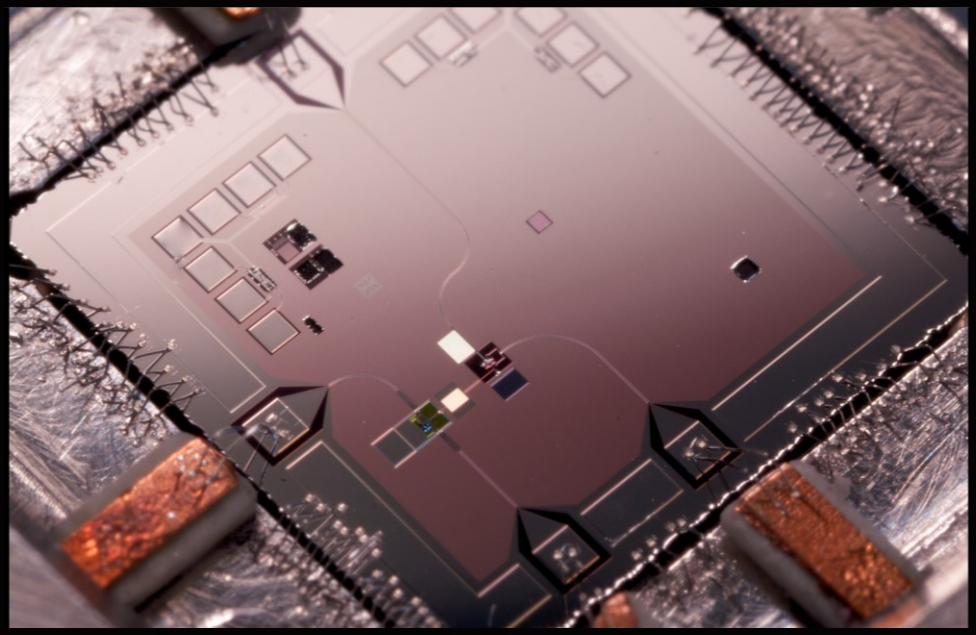
Washington DC Quantum Meetup - Monthly Meetings
https://www.eventbrite.com/o/washington-dc-quantum-computing-meetup-33793545445
Registration required x 2 - Meetup AND EvenBrite.
Do an Internet Search - Washington DC Quantum Meetup. Sometimes they have 3 to 4 meetings per month.
Helen Ma is the Director.

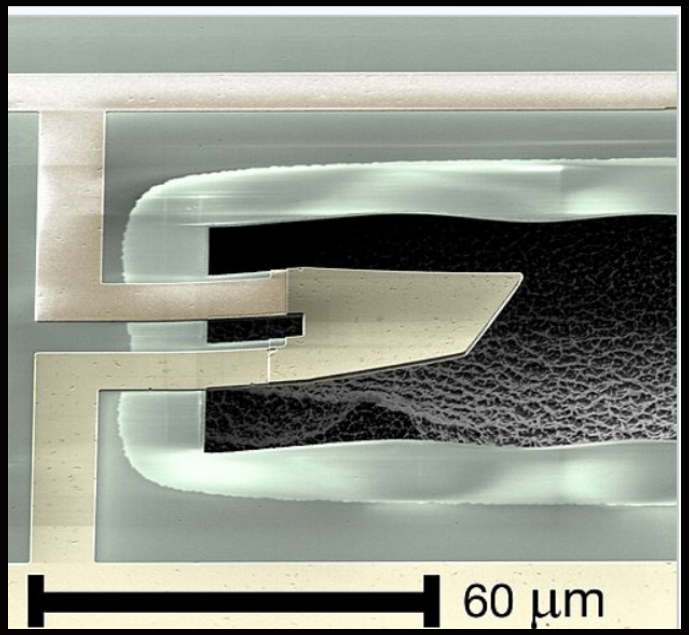
Alexandria, Egypt - Amsterdam, Netherlands Quantum Group - Monthly Meetings
https://duckduckgo.com/?q=Alexandria%2C+Egypt+-+Amsterdam++Quantum+Group&atb=v314-1&ia=web
Registration required on LinkedIn
Do an Internet Search - Alexandria Quantum Meetup. Sometimes they have 1 meetings per month, or every other Month.
Dr. Taha Selim is the Director.

Philippine Quantum Society
On Facebook, with announced Meetings on Zoom.
https://www.facebook.com/qcsp.ph
See the Quantum-Readiness Workshop, Apr 23-24:
https://quantumreadyph.qcsp.institute

World's First Quantum Machine, 2010

Wikipedia, 2011 - https://en.wikipedia.org/wiki/Quantum_machine





End of Presentation

THE MAP OF QUANTUM PHYSICS

DOMAIN OF SCIENCE

BY DOMINIC WALLIMAN © 2020

PRE-QUANTUM MYSTERIES

ATOMIC SPECTRA

BLACKBODY RADIATION

INTENSITY

WAVELENGTH

THE STABLE ATOM

PHOTOELECTRIC EFFECT

RADIOACTIVITY

QUANTUM FOUNDATIONS

THE WAVE FUNCTION

PARTICLE-WAVE DUALITY

THE BORN RULE

INTERFERENCE PATTERN

DOUBLE SLIT EXPERIMENT

THE SCHRÖDINGER EQUATION

$$i\hbar\frac{\partial}{\partial t}\Psi(\vec{r},t) = -\frac{\hbar^2}{2m}\nabla^2\Psi(\vec{r},t) + V(\vec{r})\Psi(\vec{r},t)$$

THE DIRAC EQUATION

$$i\hbar\gamma^\mu\partial_\mu\psi - mc\psi = 0$$

THE HEISENBERG UNCERTAINTY PRINCIPLE

DEFINITE POSITION

DEFINITE MOMENTUM

BELL'S THEOREM

CORRELATION

ENERGY QUANTIZATION

HIGHER ENERGY

INTERPRETATIONS OF QUANTUM MECHANICS

COPENHAGEN

WAVE

PARTICLE

THE MEASUREMENT PROBLEM

PILOT WAVE

MANY WORLDS THEORY

QBISM

AND MANY OTHERS...

CONSISTENT HISTORIES

TRANSACTIONAL INTERPRETATION

STOCHASTIC INTERPRETATION

QUANTUM DARWINISM

COSMOLOGICAL INTERPRETATION

ALTERNATIVE COLLAPSE

QUANTUM GRAVITY

M-THEORY

STRING THEORY

LOOP QUANTUM GRAVITY

QUANTUM PHENOMENA

PARTICLE PROPERTIES

POSITION

SPIN (INHERENT ANGULAR MOMENTUM)

MASS

COLOUR CHARGE

ELECTRIC CHARGE

FLAVOUR

WEAK HYPERCHARGE

BARYON NUMBER

LEPTON NUMBER

LEPTON FAMILY NUMBER

QUANTUM SPIN

SUPERPOSITION

QUANTUM NUMBERS

SCHRÖDINGER'S CAT

ENTANGLEMENT

DECOHERENCE

QUANTUM TUNNELING

QUANTUM HALL EFFECT

SUPERCONDUCTIVITY

SUPERFLUIDITY

COOPER PAIRS

CASIMIR EFFECT

TOPOLOGICAL PHASE TRANSITIONS

LOWER TEMPERATURE

HIGHER TEMPERATURE

PHASE TRANSITIONS

TEMPERATURE

QUANTUM CRITICAL REGIME

SUPERCONDUCTOR

NORMAL METAL

MAGNETIC FIELD

ZERO-POINT ENERGY

QUANTUM THEORY

POSTULATES (PARAPHRASED)

1. WAVE FUNCTION DETERMINES EVERYTHING
2. ALL OBSERVABLES HAVE OPERATORS
3. OBSERVABLES ARE HERMITIAN
4. EIGENFUNCTIONS OF OPERATORS ARE INDEPENDENT
5. EXPECTATION VALUE INTEGRAL
6. TIME DEPENDENT SCHRÖDINGER EQUATION

PATH INTEGRALS

A

B

QUANTUM FIELD THEORY

SYMMETRIES

HILBERT SPACE

PARTICLE PHYSICS

QUANTUM CHROMODYNAMICS

STRONG FORCE

ELECTROWEAK INTERACTIONS

ELECTROMAGNETISM + WEAK FORCE

γ W^- W^+ Z^0

QUANTUM ELECTRODYNAMICS

QUANTUM INFORMATION

QUANTUM CRYPTOGRAPHY

QUBITS

0

1

QUANTUM COMPUTING

QUANTUM SIMULATION

QUANTUM TELEPORTATION

BELL-STATE ANALYSER

CLASSICAL SIGNAL

ENTANGLED PHOTONS

QUANTUM COMMUNICATION

QUANTUM INTERNET

QUANTUM COMPLEXITY COMPUTATIONAL COMPLEXITY

P SPACE

NP PROBLEMS

NP COMPLETE

P PROBLEMS

BQP

THE STANDARD MODEL OF PARTICLE PHYSICS

FEYNMAN DIAGRAMS

ANTI-MATTER

PROTON

ANTI-PROTON

P

$\bar{P}$

QUARKS

u c t d s b

γ g H

e μ τ W Z ν_e ν_μ ν_τ

THE HIGGS BOSON

GAUGE BOSONS

LEPTONS

SOLID STATE DEVICES

BAND THEORY OF SOLIDS

N-TYPE

P-TYPE

HOLES

ELECTRONS

TRANSISTORS

SOURCE

GATE

DRAIN

N-TYPE

P-TYPE

SOLAR PANELS

QUANTUM TECHNOLOGY

LIGHT EMITTING DIODES

POSITIVE TERMINAL

NEGATIVE TERMINAL

SUPERCONDUCTING MAGNETS

S.Q.U.I.D.S

JOSEPHSON JUNCTION

LASERS

CHARGE-COUPLED DEVICES

CCD SENSOR

ATOMIC CLOCKS

ELECTRON MICROSCOPES

SCANNING TUNNELING MICROSCOPES

ATOMIC FORCE MICROSCOPES

NUCLEAR MAGNETIC RESONANCE IMAGING

MAGNETIC RESONANCE IMAGING

CONDENSED MATTER PHYSICS

QUANTUM BIOLOGY

PHOTOSYNTHESIS

BIRD NAVIGATION

SENSE OF SMELL

ENZYMES

COLD ATOM PHYSICS

DEGENERATE ULTRACOLD GASES

DEGENERATE FERMI GAS

BOSE-EINSTEIN CONDENSATE

RYDBERG MATTER

PARTICLE ACCELERATORS

QUANTUM CHEMISTRY

ELECTRONIC STRUCTURE

MOLECULAR DYNAMICS

QUANTUM MONTE CARLO METHODS

NUCLEAR PHYSICS

NUCLEAR FISSION

NUCLEAR FUSION

RADIOACTIVE DECAY

ALPHA DECAY

BETA DECAY

e^-

GAMMA DECAY

γ