Plugging Quantum Power into PLM & Teamcenter

Faster Product Choices • Safer Supply Chains

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Why Quantum-Assisted PLM?

$22M

Disruption Cost

Average cost per supply chain incident (Interos 2023)

$1.5M

Daily Burn

Lost revenue during production outages (Supply Chain Dive 2025)

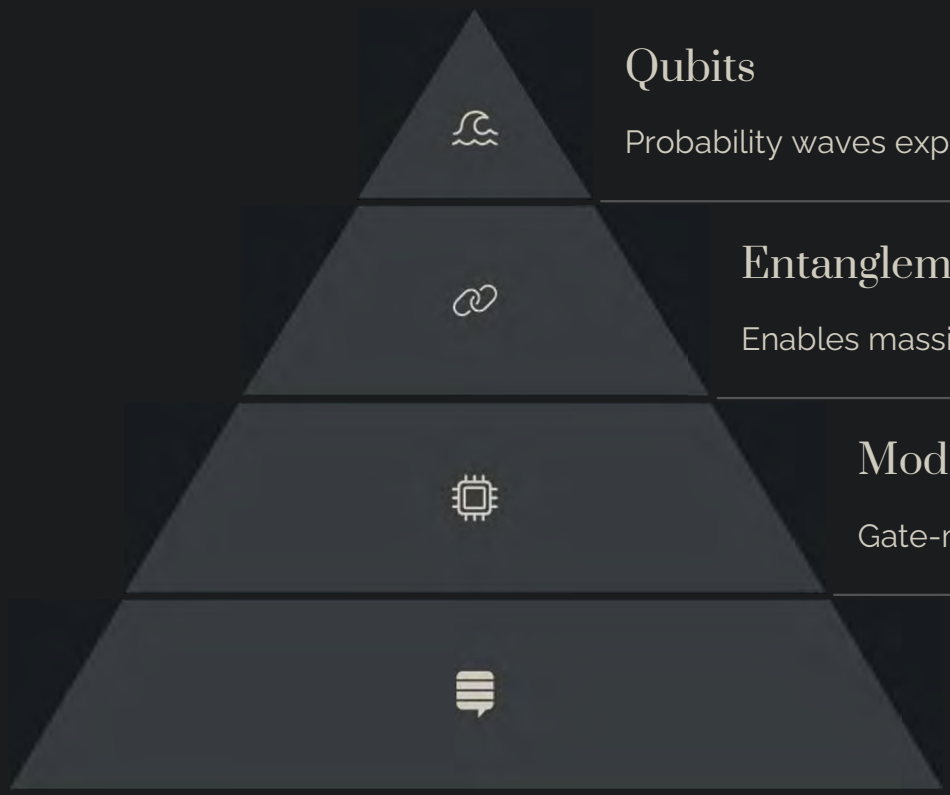
15T

Variant Options

Number of possible MINI build configurations (FT 2021)

Classical PLM checks scale poorly. Quantum computing dramatically prunes search spaces.

Quantum Computing 101



Qubits

Probability waves explore many states simultaneously

Entanglement

Enables massive parallel search capabilities

Modalities

Gate-model, Annealing, and Neutral-Atom approaches

NISQ Era

Hybrid quantum-classical workflows dominate near-term

May 2025 Hardware Snapshot

D-Wave Advantage2

4,400-qubit annealer (GA May 2025)

Pasqal Neutral-Atom

100-qubit QPU available on Google Cloud

IBM Quantum

127-qubit Eagle; 1,386-qubit 'Kookaburra' roadmap 2025

Fujitsu DA

8,192-bit system live in Toyota Tsutsumi sequencing

Integration Pattern

Extract Data

Pull BOM/variant data via Active Workspace REST

Transform

Translate to QUBO or Monte-Carlo payload

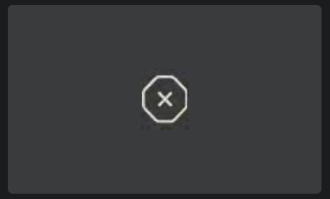
Process

Invoke quantum cloud service; retrieve optimal solutions

Store

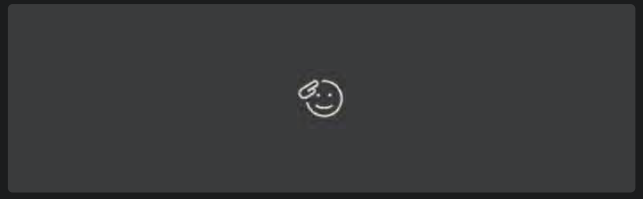
Persist alt-BOMs & risk scores back into Teamcenter

Use-Case I: Variant-Configuration Acceleration



Challenge

15 trillion MINI options exemplify NP-hard rule constraints



Solution

Quantum algorithms prune configuration search space exponentially

Results

Toyota & Fujitsu achieved 90% sequencing runtime reduction

Sub-second feasible configurations now possible for BOMs with 10,000+ variables.

Use-Case 2: Supply-Chain Risk Simulation

Speed Advantage

Quantum Amplitude Estimation delivers √N acceleration

Recovery Planning

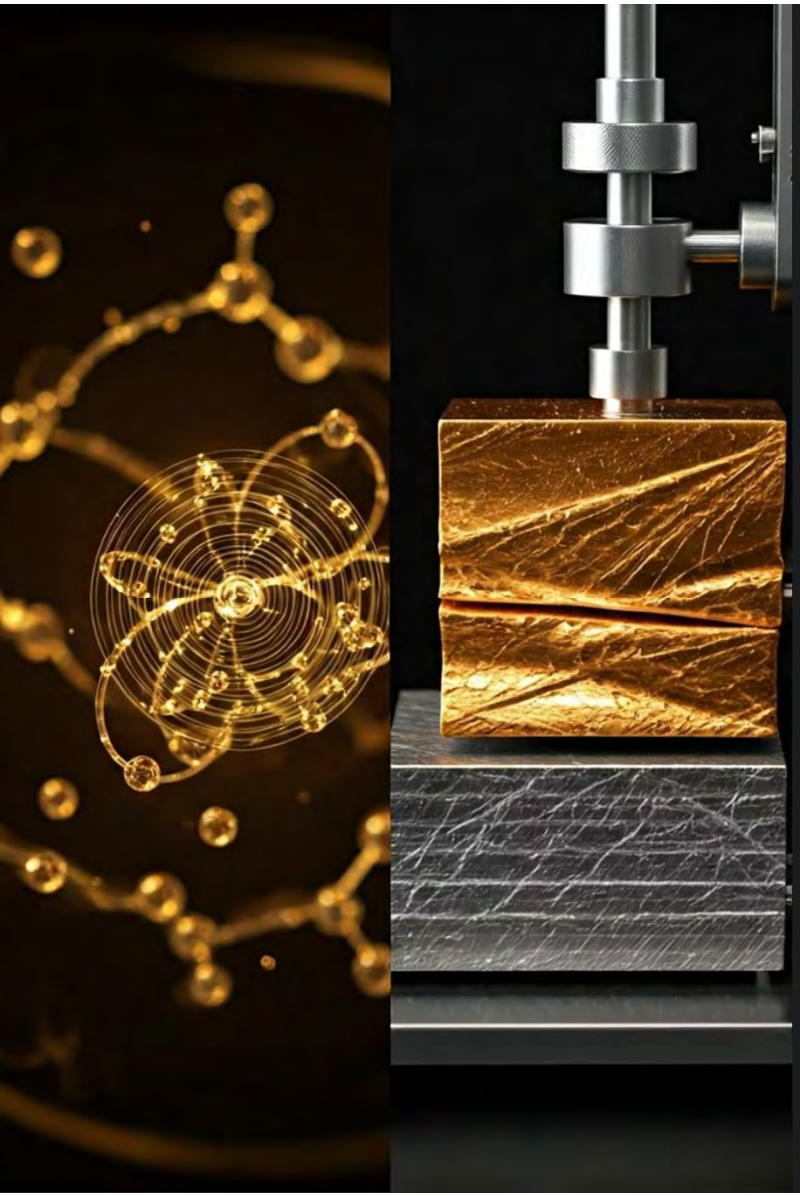
138 hours → 19 hours for complete analysis

Scenario Reduction

Newsvendor study: 1M → 10K scenarios, same accuracy

Time Savings

D-Wave hybrid: 12 → 290 scenarios/minute



Use-Case 3: Product-Design & Materials

Battery Optimization

Thermal CFD convergence time reduced by 92%

Crash Simulation

FEA run count reduced by 68%, saving $2.1M per platform

Materials Science

Quantum-chemistry simulations: 100,000-atom polymers in 8 hours vs 72

Quantum simulations dramatically accelerate design cycles across multiple domains.

Early Adopters

Toyota

Digital Annealer technology optimizes assembly sequencing at Tsutsumi plant.

BMW + Pasqal

Neutral-atom quantum computing enhances metal-forming processes.

Jülich + D-Wave

Quantum-assisted logistics and AI route optimization pilots show promise.

Industry leaders are already implementing quantum solutions. Early results demonstrate significant efficiency gains across manufacturing operations.

Executive Momentum

January 2025

SAP CEO announces week-long MRP calculations reduced to just 1 hour with quantum computing.

1

March 2025

Siemens Digital Industries increases funding for quantum-ready simulation stack development.

2

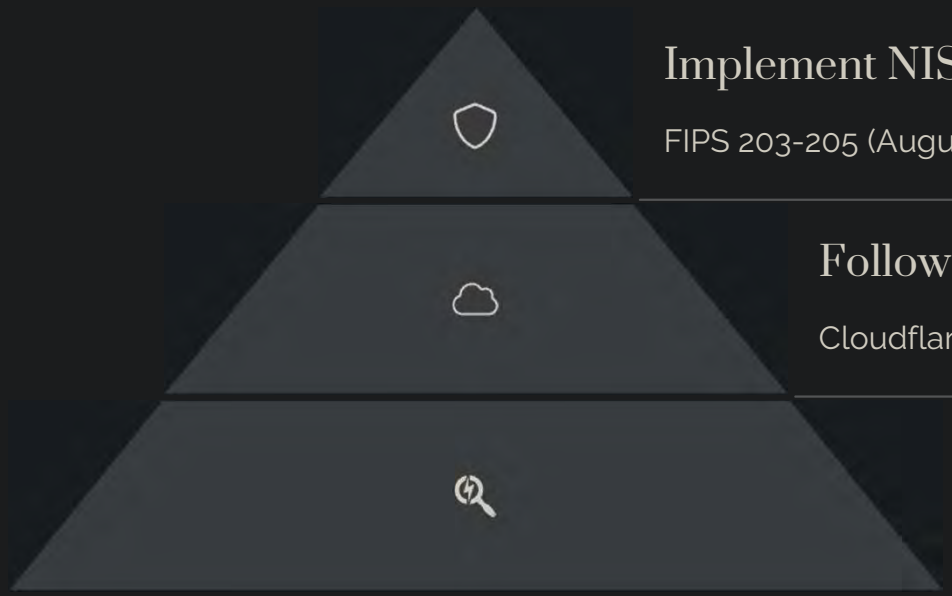
April 2025

Board-level interest accelerates industry-wide quantum adoption initiatives.

3

C-suite executives recognize quantum's strategic value. Investment is increasing. The market is shifting from experimentation to implementation.

Security & Post-Quantum Crypto



Implement NIST PQC Standards

FIPS 203-205 (August 2024)

Follow Industry Leaders

Cloudflare: 2% of TLS traffic already PQ-secure

Audit Vulnerable Endpoints

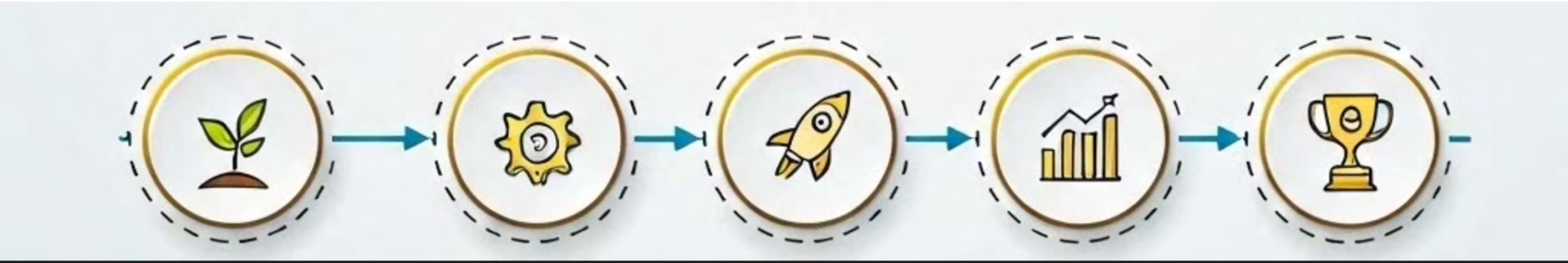
Identify RSA-2048 in Teamcenter supplier portal

Quantum computers will break traditional encryption. Preparation is essential. Post-quantum cryptography protects your supply chain data now and future-proofs your systems.

Risks & Mitigations

Risk	Mitigation
• Qubit decoherence	• Hybrid error-aware algorithms
• Vendor lock-in	• Open QIR/SDK portability
• Skill shortage	• Siemens-vendor training pipeline
• Over-hype	• Phase-gated ROI checkpoints

Every emerging technology presents challenges. Our approach balances innovation with pragmatic risk management. Hybrid solutions offer immediate benefits while preparing for full quantum advantage.



24-Month Roadmap

0-3 Months: Exploration

Identify PLM hotspots for quantum acceleration. Develop cloud-based proof-of-concept implementations. Focus on high-value use cases.

4-12 Months: Integration

Deploy quantum micro-services. Benchmark performance against traditional CPU solutions. Refine algorithms for production use.

12-24 Months: Expansion

Scale solution to multi-site dashboard. Complete post-quantum TLS security rollout. Measure and report ROI metrics.

Our phased approach ensures controlled implementation. Each stage builds on previous successes. Regular assessments guarantee alignment with business objectives.

People & Process

Establish Roles

Create 'Quantum Translator' position within PLM Center of Excellence

Build Skills

Host variant-rule QUBO hackathons for hands-on learning

Iterate Approach

Continuously refine implementation based on results

Measure Progress

Add quantum-specific KPIs to PLM scorecards

Technology alone isn't enough. Success requires people and process alignment. Our framework develops internal capabilities while measuring tangible outcomes.

Closing: The Journey Ahead

Current Challenges

Hardware limitations persist. Hybrid approaches and privacy frameworks remain essential for near-term implementation.

Transformative Potential

Quantum computing enables innovations unimaginable just a few years ago. New possibilities emerge daily.

Future Direction

Our trajectory points toward smarter, faster, and more sustainable PLM systems. Early adoption creates competitive advantage.

The quantum revolution in PLM has begun. Organizations that prepare now will lead tomorrow. Let's build this quantum-enhanced future together.

Thank you!