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Technology

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CEPS: Strengthening the EU Transition to a Quantum-Safe World

- This CEPS Task Force report addresses the European Union's urgent need **to transition to quantum-safe cryptography** in light of the anticipated emergence of cryptographically relevant quantum computers (CRQCs). These machines, which may be capable of breaking existing public-key cryptographic systems within the next decade, pose significant threats to digital security across all sectors.
- The report frames this transition as a **systemic transformation**, not a routine technical upgrade. It emphasises the need for **Post-Quantum Cryptography (PQC)** - mathematically secure algorithms resistant to quantum attacks - as the cornerstone of the transition. Complementary technologies like **Quantum Key Distribution (QKD)** and **Quantum Random Number Generators (QRNGs)** are recognised for their niche contributions, particularly in high-security contexts, but PQC remains the primary path forward.
- A central recommendation is the adoption of a **risk-based, crypto-agile approach**, involving:

Mapping and managing supply chain cryptographic dependencies; Maintaining crypto and product inventories; Implementing hybrid cryptographic models (e.g., PQC with classical or QKD-based systems); Aligning transition plans with digital transformation efforts.

- The report critiques the notion of a sudden "**Q-Day**," advocating instead for a "**Q-period**" - a gradual emergence of quantum capabilities requiring staged migration strategies. It underscores that most EU stakeholders remain underprepared, with only a few Member States (Germany, France, the Netherlands) having initiated national roadmaps or pilot projects.
- To address fragmentation and delay, the Task Force proposes a **coordinated EU roadmap** that aligns with regulatory frameworks (e.g. NIS2, Cyber Resilience Act), promotes parallelisation, and enhances cross-border coherence. It calls for a **PQC Migration Observatory**, greater investment in skills development, and structured governance for public, financial, and defence sectors.