Cryptography and Quantum Key Distribution for long term secret storage

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Agenda

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LONG TERM SECRET STORAGE?

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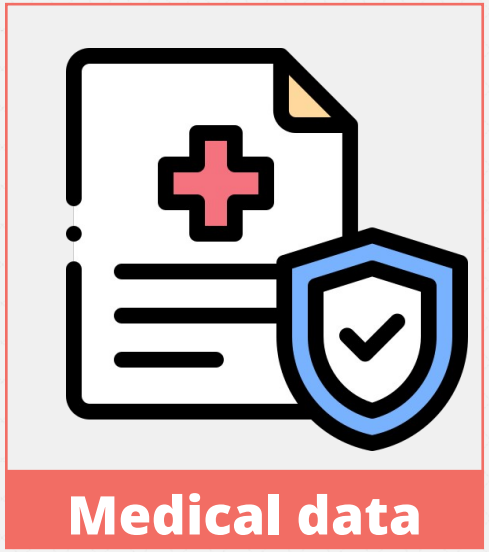
BACKWARD COMPATIBLE EXTENDED QUANTUM TRANSMISSION

03

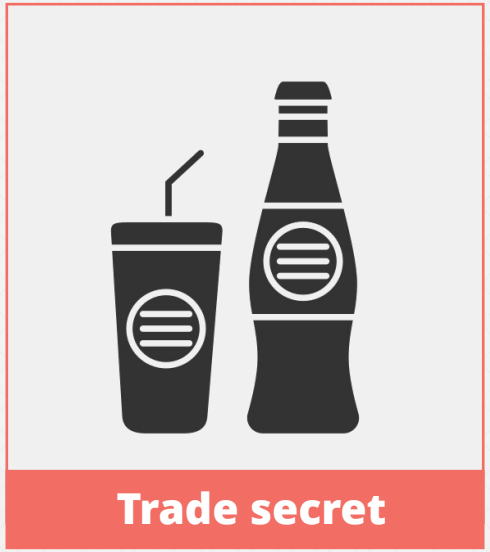
MULTISS: DISTRIBUTED QUANTUM STORAGE

Why long term secret storage?

Some data may require confidentiality over decades



Medical data



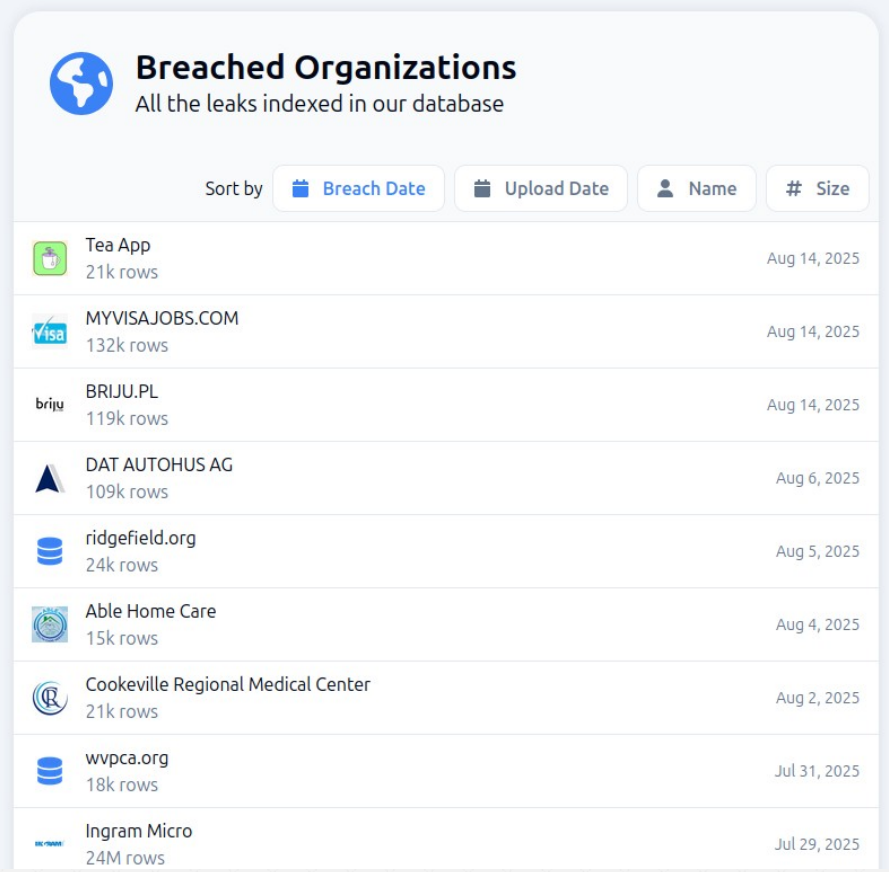
Trade secret

State secret

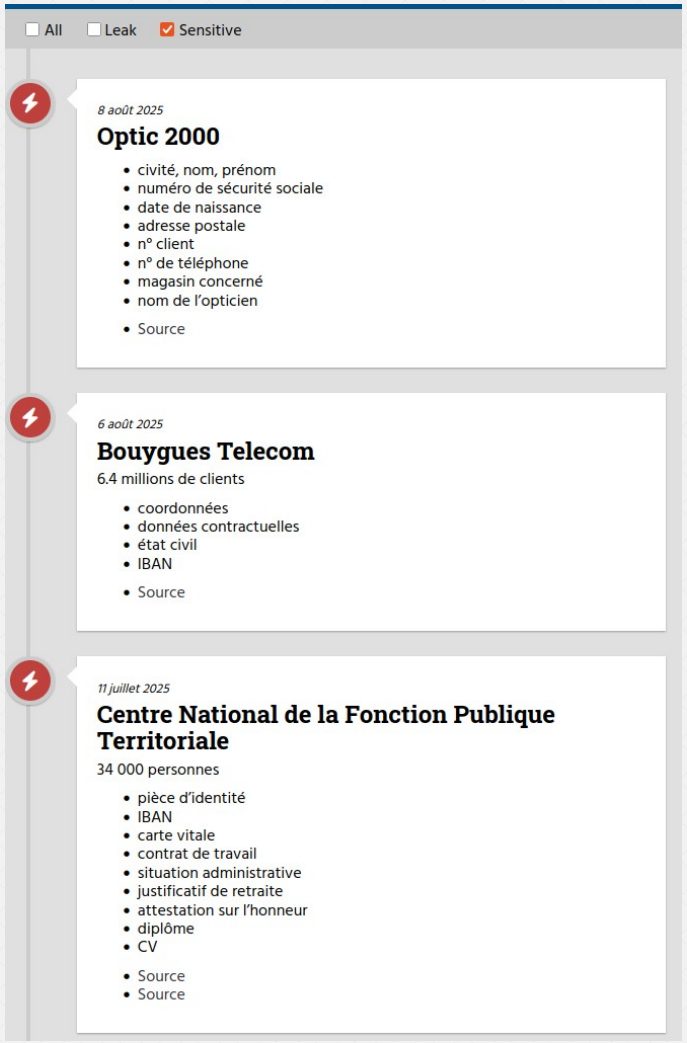
Cloud storage: risky

More and more organisation migrate their data storage on the Cloud for cost and praticity

Data leaks

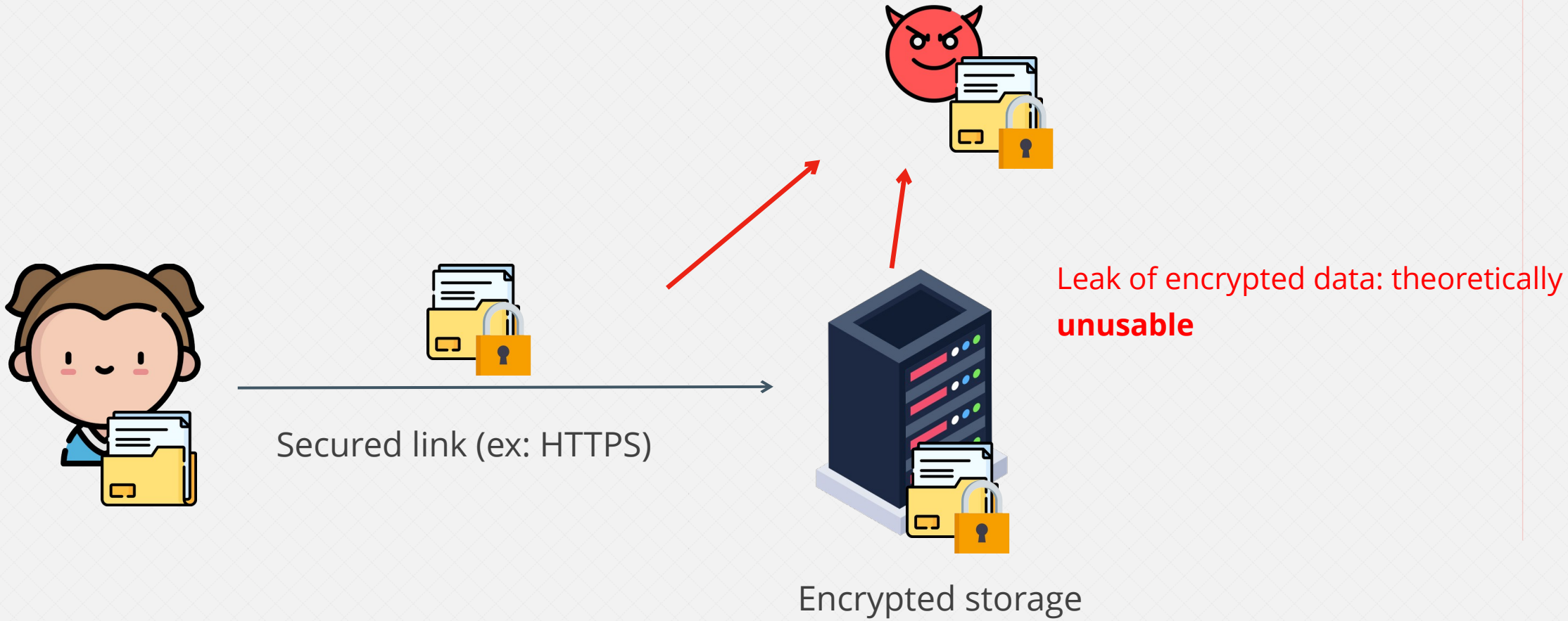


Source: https://databreach.com/breach



Source: https://bonjourlafuite.eu.org/

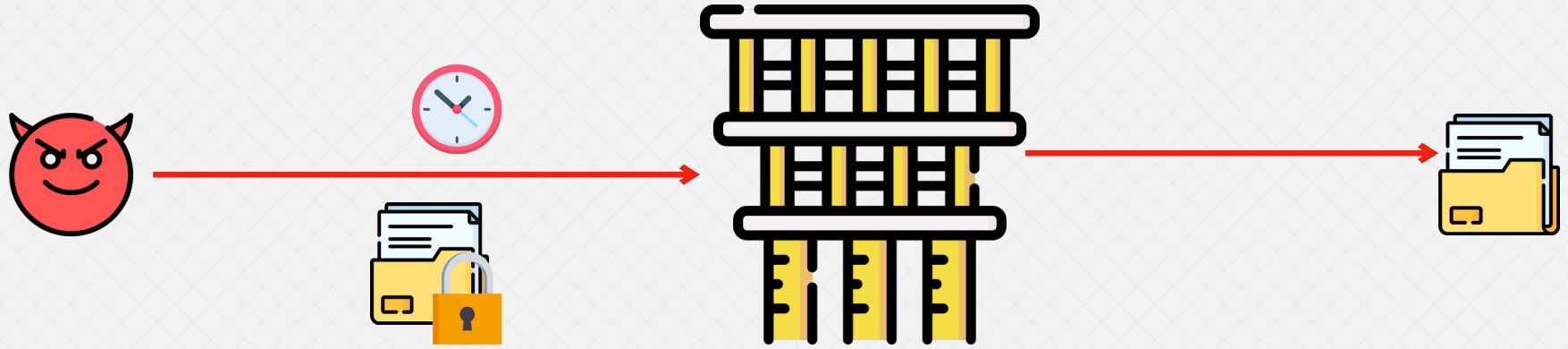
Solution: cryptography



Required for managing credit cards, for example (PCI-DSS)

Long term cryptography?

Increased computing power, advances in cryptanalysis, and the advent of quantum computers will allow an attacker to break current encryption



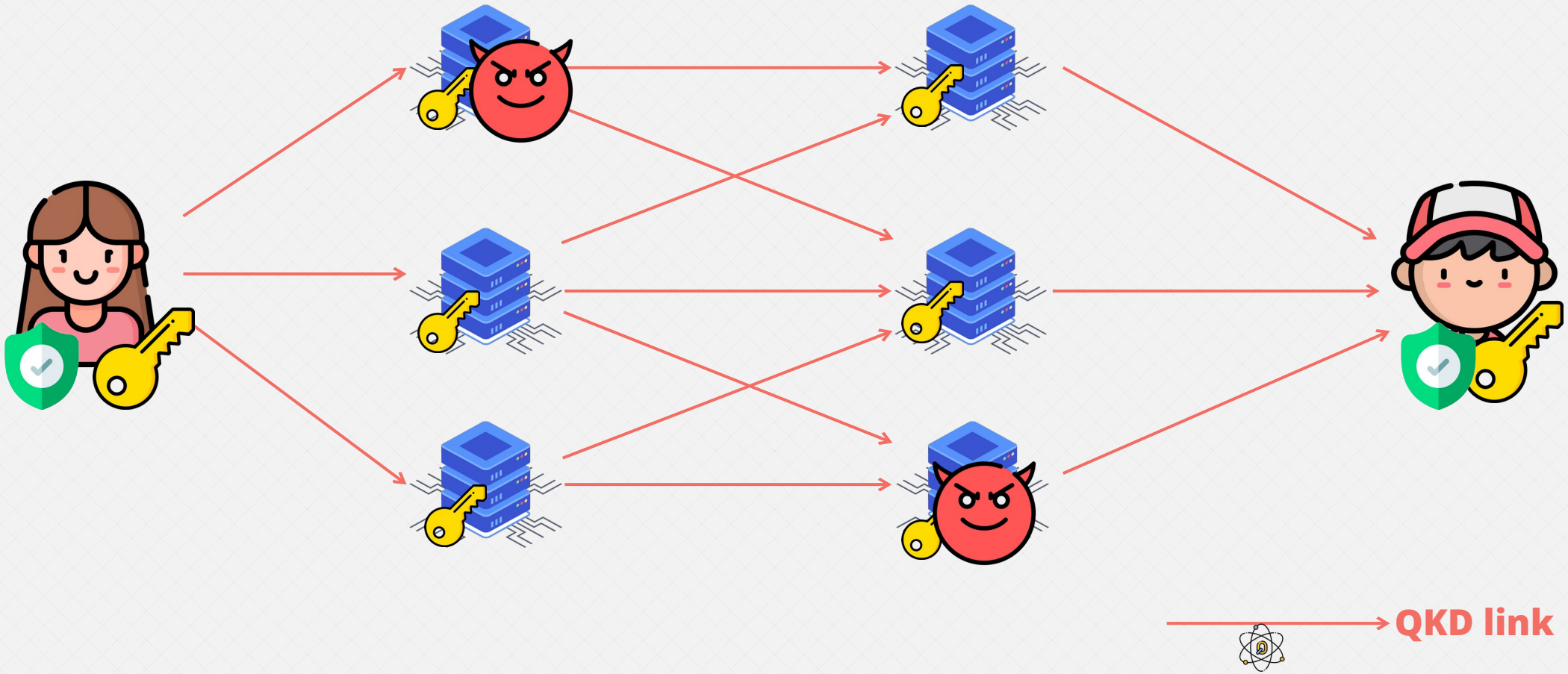
«*Harvest now, decrypt later*» attack

Post-quantum cryptography?

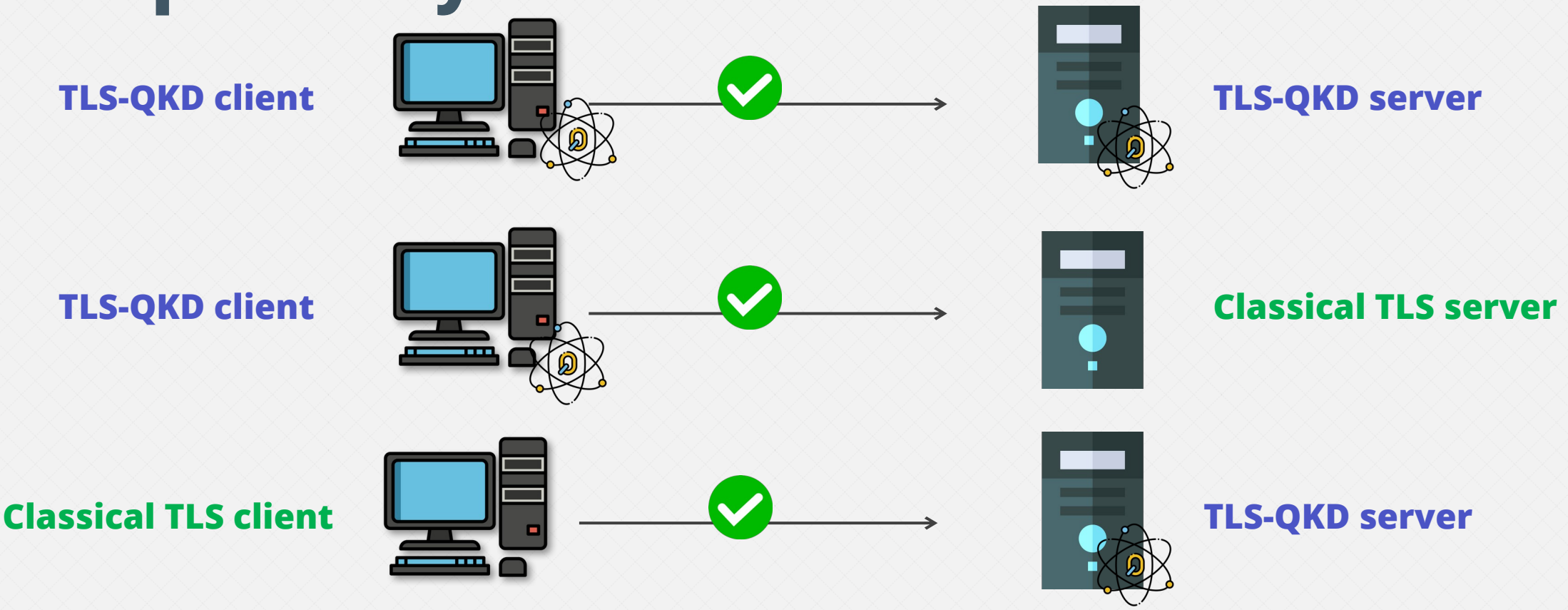
The mathematical foundations are too recent for "long-term security"

TLS-QKD: BACKWARD COMPATIBLE EXTENDED QUANTUM TRANSMISSION

Extended transmission

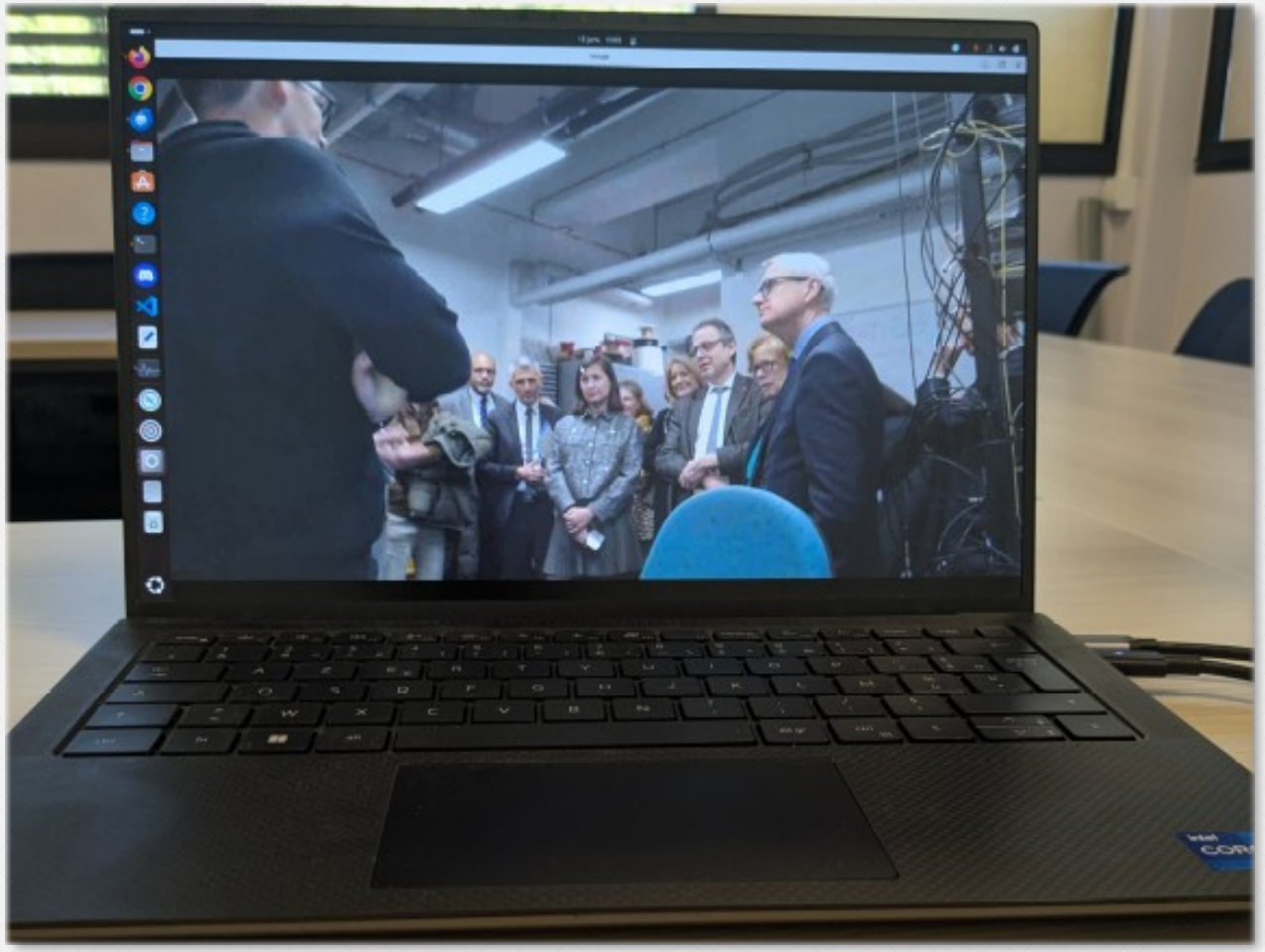


TLS (HTTPS) backward compatibility



Two-way backward compatibility facilitates the gradual migration of existing systems

Demonstration



Demonstration of a video conference call encrypted with quantum keys during the inauguration of the INPHYNI laboratory, on January 15, 2025, between Nice and Sophia-Antipolis

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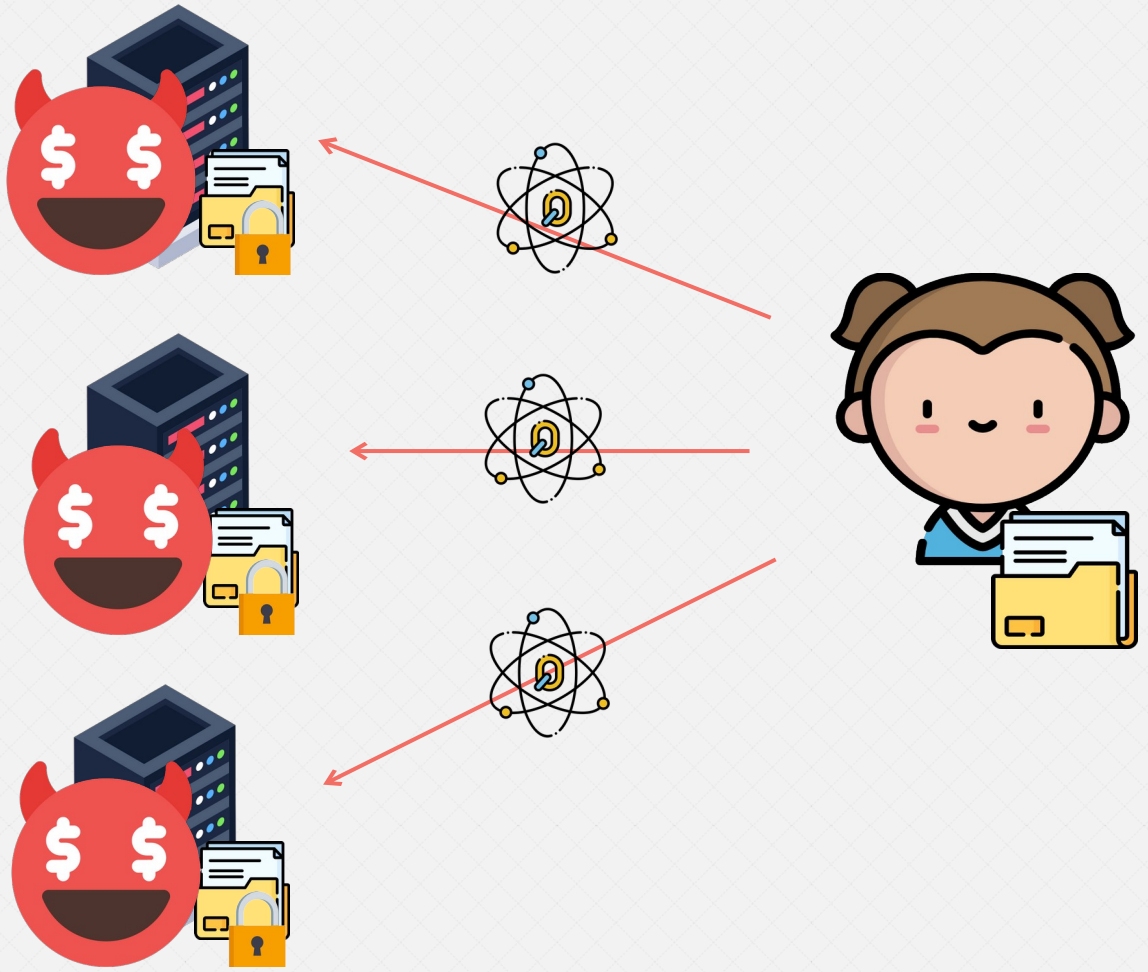
MULTISS: DISTRIBUTED QUANTUM STORAGE

With 

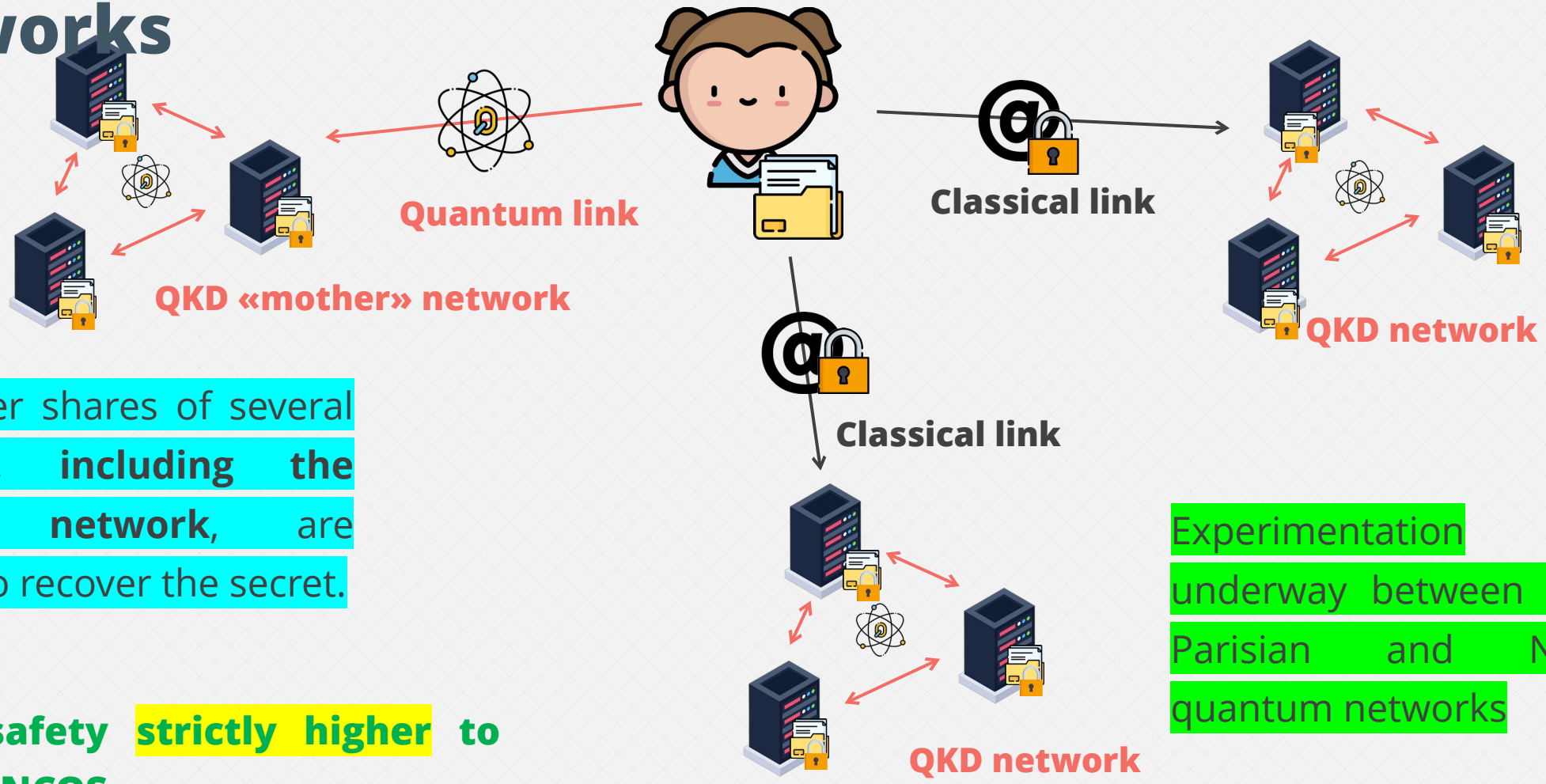
LINCOS: Confidential secret storage on a single QKD network

The shares of a majority of nodes on the local QKD network are needed to recover the secret

The assumption that an attacker could not take control of all servers is dangerous



MULTISS: Confidential secret storage on multiple QKD networks



The server shares of several networks, **including the mother network**, are needed to recover the secret.

Proven safety strictly higher to that of LINCOS

Experimentation underway between the Parisian and Nice quantum networks

Thank you!

Questions ?