

Europol Report "The Second Quantum Revolution"



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News

On 23 October 2023, Europol [published](#) a new [report](#) looking at the impact of quantum computing and quantum technologies on law enforcement. The report was drafted by Europol's Innovation Lab in cooperation with the European Commission's Joint Research Centre (JRC) and Europol's European Cybercrime Centre (EC3).

While classical computers use binary bits to perform calculations, quantum computers use quantum bits to make calculations and to execute certain algorithms. In this way, the number of calculations needed to solve specific problems is significantly reduced. An example of one of the immediate areas where such quantum computing may have an impact is the field of cryptography and, hence, the protection of sensitive information.

This is why this first-time report takes a detailed look at the impact of quantum computing on cryptography, pointing out a number of opportunities and threats deriving from existing and future quantum computing possibilities. They include the concept of "store now - decrypt later" that offers possibilities for both law enforcement and criminals to gain later access to encrypted evidence/information. Quantum password guessing may open new possibilities particularly for law enforcement to improve its ability to gain access to password-protected information in high-profile criminal cases. In the field of digital forensic investigation techniques, quantum devices may offer new opportunities for law enforcement to extract and analyse data. The report also looks at the impact of post-quantum cryptography, i.e. cryptographic schemes that can run on classical computers without being vulnerable to quantum computer attacks. It emphasizes, however, that being resistant to quantum computer attacks does not ensure overall security. Therefore, sensitive information and systems must be protected adequately and vulnerabilities identified.

The second part of the report looks at the overall impact of quantum technologies such as quantum machine learning, quantum communications, quantum metrology, and quantum sensors. Techniques from quantum machine learning and enhanced AI systems will offer new possibilities for data analysis, computer vision, biometrics, and many more areas of law enforcement. At the same time, AI can be considered a classical dual-use technology, with cybercriminals using these techniques equally to their advantage.

Quantum communication technologies may generate positive and negative effects, as both law enforcement and criminals may be able to make use of quantum communications to establish highly secure communication channels for information exchange. Improved accuracy, precision, and sensitivity of measurements through quantum sensors could improve the precision of crime scene forensics, surveillance and detection capabilities, and real-time decision making in critical situations.

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Lastly, the report makes five law enforcement recommendations with regard to developments in quantum computing and technologies. Law enforcement shall:

- Observe quantum trends and monitor relevant developments to detect emerging threats;
- Build up knowledge and start experimenting to benefit from these developments in the future;
- Foster research and development projects, engaging closely with scientific community to build a network of expertise;
- Assess the impact of quantum technologies on fundamental rights to ensure that these new technologies are used while protecting fundamental rights;
- Review its organisation's transition plans to ensure that critical systems are protected in the post-quantum era.

Europol concluded that the observatory report served as a first in-depth exploration of the impact of quantum computing and quantum technologies from the perspective of law enforcement, but there is a need for further work and research to fully comprehend and navigate the quantum era.

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