Czechia an attractive partner in cybersecurity research

In Czechia, outstanding research is being conducted across multiple domains of cyber and information security. Areas of focus include the analysis and development of cryptographic tools and post-quantum cryptography schemes, compromising electromagnetic radiation (TEMPEST) and zone measurement techniques, network probes, and network traffic analysis for threat detection and response. The high quality of Czech research is further demonstrated by the global success of Czech-developed cybersecurity commercial solutions.

The Czech research environment is characterized by a high degree of integrity. Mutual understanding among various stakeholders, along with the long-term partnerships established through collaborative efforts, fosters synergies across the national research landscape. This environment is overseen by the National Cyber and Information Security Agency (NÚKIB), which plays a coordinating role by facilitating intersectoral collaboration between the public administration, academia, and the private sector. At the national level, the agency is building a research and development ecosystem through the Cybersecurity Research and Innovation Group (CYRIS). On the international level, it oversees Czech entities in this domain through the National Coordination Centre (NCC), which serves as the contact point for the European Cybersecurity Competence Centre (ECCC).

In most of the research areas, Czech researchers maintain extensive collaborations with leading research institutions worldwide. Czech research institutions are part of EU networks such as ICON and have been selected to lead two new EU-funded cybersecurity initiatives: QARC and CCAT. The Czech research community also benefits from the fact that Czechia hosts a powerful supercomputing infrastructure. The National Supercomputing Center IT4INNOVATIONS operates a powerful supercomputer and has been selected to host the LUMI-Q consortium's quantum computer. In addition, through its participation in the European LUMI consortium, the Czech national supercomputing center has access to the supercomputer at CSC's data center in Kajaani, Finland.

Three Czech universities - Czech Technical University in Prague, Brno University of Technology, and Masaryk University in Brno - have jointly established the CyberSecurityHubCZ, which currently coordinates several strategic cybersecurity projects. These include the European Digital Innovation Hub (EDIH), which primarily focuses on providing cybersecurity services to small and medium-sized enterprises, as well as public organizations. Other projects focus on the field of chip technologies (ACDRC), quantum communication infrastructure (CZQCI) and providing cybersecurity exercises (CyberRangeCZ).

Key research sub-areas for cooperation

Cybersecurity	**Modern Cryptography**
Forensic and malware analysis	Cryptographic design
Incident handling and rapid response teams	Post-quantum cryptography schemes
Vulnerability detection and zero-day vulnerabilities	Implementation aspect of modern cryptography
Honeynets and honeypots	Privacy-enhancing protocols
Vulnerability scanning	**Quantum Technologies**
Detection systems and specialized testing	Quantum communication infrastructure
Usable security	**Analytical Tools**
Privacy-preserving technologies	Cyber Threat Intelligence
Compromising Electromagnetic Emissions	OSINT (Open-Source Intelligence)
TEMPEST issues	**Datasets**
Optical and 5G networks	Datasets designed for training technologies
Shielding chambers and information protection in meeting rooms	Data registries and repositories to facilitate access for further research
	Certification

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Leading Czech Institutions in Cybersecurity Research (in alphabetical order)

- **Brno University of Technology** – The Applied Cryptography and Security Engineering (AXE) Group at Brno University of Technology focuses on applied cryptography and cybersecurity in modern information and telecommunication systems. AXE deals with the secure implementation of post-quantum cryptography and its hardware acceleration using FPGA platforms. Furthermore, AXE focuses on privacy-preserving and security designs for heterogeneous networks that include the Internet of Things (IoT), vehicles, industrial devices etc.
- **CESNET** is a research organization that operates a high-performance national research and education network, enabling secure access to advanced computing, data storage, and communication tools for academic and scientific communities. Such an environment gives CESNET access to real-world data to support its research and helps validate its results in realistic conditions. CESNET conducts cutting-edge research in network cybersecurity, applying machine learning and artificial intelligence to network traffic classification, attack detection, DDoS mitigation, IP reputation, malicious URL detection, IoC sharing, log analysis, and honeypot development and deployment. CESNET's results are regularly published in top-tier scientific venues, including Nature Scientific Data. Beyond academic excellence, CESNET translates its research into real-world applications—developing open-source tools and operational services used in its SOC/NOC processes as well as partnering with commercial technology companies to bring innovations to the market. This dual focus on research and application has earned CESNET numerous prestigious awards.
- **Czech Academy of Sciences** – Topics related to cybersecurity are primarily addressed by the Institute of Computer Science and the Institute of Information Theory and Automation, particularly in the area of security of machine learning methods and deepfake detection. The Institute of State and Law focuses on the legislative aspects of cybersecurity.
- **Czech Technical University (CTU)** – The Stratosphere Laboratory at CTU in Prague is a research group operating at the intersection of cybersecurity, machine learning, and helping others. Research includes developing the first free-software, machine learning-based network intrusion detection system, advanced AI-powered honeypots that simulate human-like interactions to deceive attackers, automated agent systems to solve cybersecurity tasks, and researching privacy-preserving techniques in machine learning. The group also studies malware behavior in network environments, sharing public state-of-the-art datasets with the community. Their Civilsphere initiative focuses on applied research to protect civil society members facing targeted digital threats.
- **Masaryk University (MUNI)** approaches cybersecurity research from multiple perspectives, addressing not only technology aspects but also legal/regulatory, societal, psychological and theory of computing ones. MUNI hosts the Czech Cybersecurity Innovation Hub, leads the Cyber-security Excellence Hub in Estonia and South Moravia (CHESS) and other international as well as national R&D projects. These initiatives connect universities, companies, governmental information security agencies, and other institutions engaged in cybersecurity research and development. MUNI's activities aim to leverage the strengths of partners to address key cybersecurity challenges.
- **University of West Bohemia in Pilsen** has established expertise in quantum materials essential for quantum sensors (NTC), as well as in communication with advanced system identification, anomaly detection, and intelligent decision-making based on machine learning and next-generation sensor data (FAV).
- **VŠB - Technical University Ostrava** – The NAVY research group focuses on unconventional algorithms and their application in malware detection and prediction. The group's research integrates artificial intelligence, bio-inspired approaches, and fractal analysis to develop innovative methods for analyzing cyber threats. Its publications explore both the defensive and offensive roles of AI in cyberspace, contributing to a deeper understanding of the dynamics of cyberattacks and cyber defense. Collaboration with the National Supercomputing Center IT4Innovations enables the execution of computationally intensive, high-impact projects. Excellence in the field is affirmed by numerous international publications and membership in prestigious scientific societies.

Czech Science Diplomacy

For more information related to international collaboration in research and higher education, you may contact the Science Diplomacy Unit at the Ministry of Foreign Affairs of the Czech Republic at science@mzv.gov.cz.