LASARIS IN 2017 AND BEYOND

LAB OF SOFTWARE ARCHITECTURE AND INFORMATION SYSTEMS

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LAB OF SOFTWARE ARCHITECTURES
AND INFORMATION SYSTEMS

FACULTY OF INFORMATICS
MASARYK UNIVERSITY, BRNO

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FI MU Research Competences

RESEARCH & DEV. carried out in **4 research centres** and **12 research labs**.

- **Enterprise Systems and Services**
  - **Software Architectures and Enterprise Systems**
  - Service systems, modeling and execution
- **Security and Embedded Systems**
  - Security management, cryptographic protocols
- **Large Scale Distributed Systems and Networks**
  - Distributed computing and storage systems, scheduling and planning
- **Data Management**
  - Machine learning, data mining, advanced searching methods
- **Formal Methods**
  - Parallel algorithms for formal verification, analysis of stochastic processes and games
- **Natural Language Processing**
- **Computer Graphics and Image Processing**

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Industrial Cooperation at FI MU

FI MU has long history of established forms of cooperation with industry:

- **Technology Transfer Office of Masaryk University (TTO)** **http://www.muni.cz/ctt**
  - Since **2005 by MU**, now includes **ICT pillar** (Čermák, Pitner, Šimková, Rada)
- **Association of Industrial Partners (AIP)** **http://www.fi.muni.cz/for_partners**
  - Established in **2007 at FI MU**, with the goal to establish mutually beneficial cooperation of industry and academia, now managed by Bára Bühnová
- **SSME Internship Partnership** **http://ssme.fi.muni.cz/en/partner**
  - Established in **2009 within the SSME** study programme at FI MU, with the aim to connect academia with industry via **internship opportunities** for SSME students.
- **CERIT Science Park (CERIT SP)** **http://www.cerit.cz/en/cerit-sp/**
  - Established in **2014 at FI MU** as a science-technology park and a **business incubator** promoting the excellence of FI MU and its partners in ICT research and innovation.

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Lab of SW Architectures and Information Systems

- **History of LaSArIS**
  - Established in **2009**
  - Own premises since **2010**
  - Located at Botanicka 68a, Brno
- **Members**
  - **4** academicians
  - **10** PhD students
  - **15+** undergraduate students
- **Teaching**
  - Programming (basic, enterprise, mobile – Java, C#, C, Ruby, XML)
  - Development methods (OO, architecture-based, agile, process management)
  - Soft skills (team work, communication)
- **Partners**
  - **Industrial cooperation** – research, student projects, teaching
    Red Hat, Honeywell, Siemens, Y Soft, Kentico, Mycroft Mind, and others
  - **Academic institutions** – research projects, teaching, conferences
    University of Vienna, Karlsruhe Institute of Technology (KIT), …

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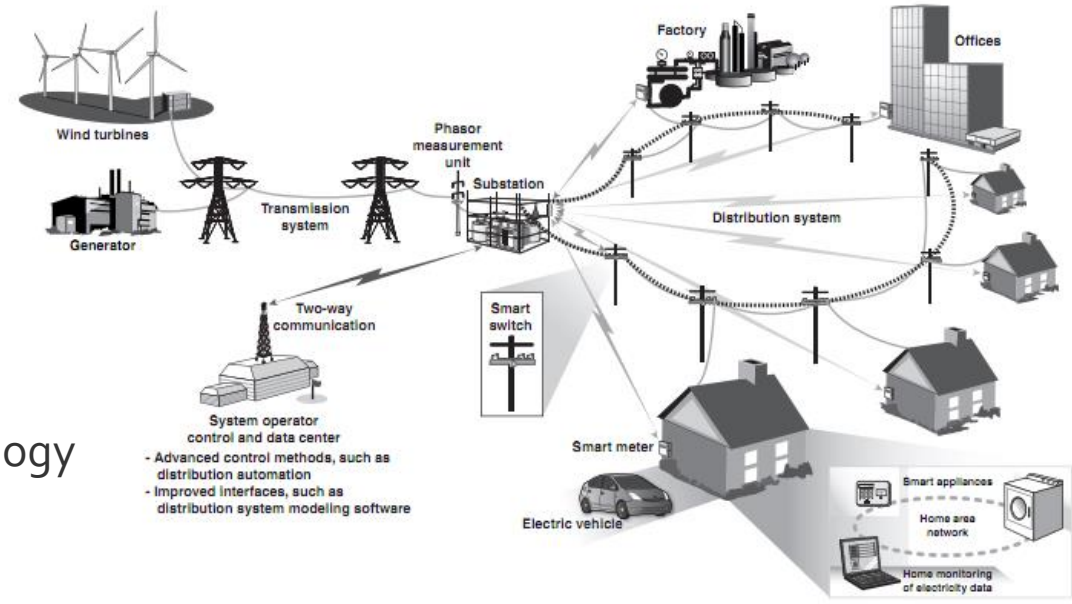
Our research in the context of 'Secure'

- Research
  - **Secure infrastructures**
    - Monitoring systems
    - Network security
  - **Smart grids**
    - Design
    - Communication technology
    - Secure operation
    - Reliable operation



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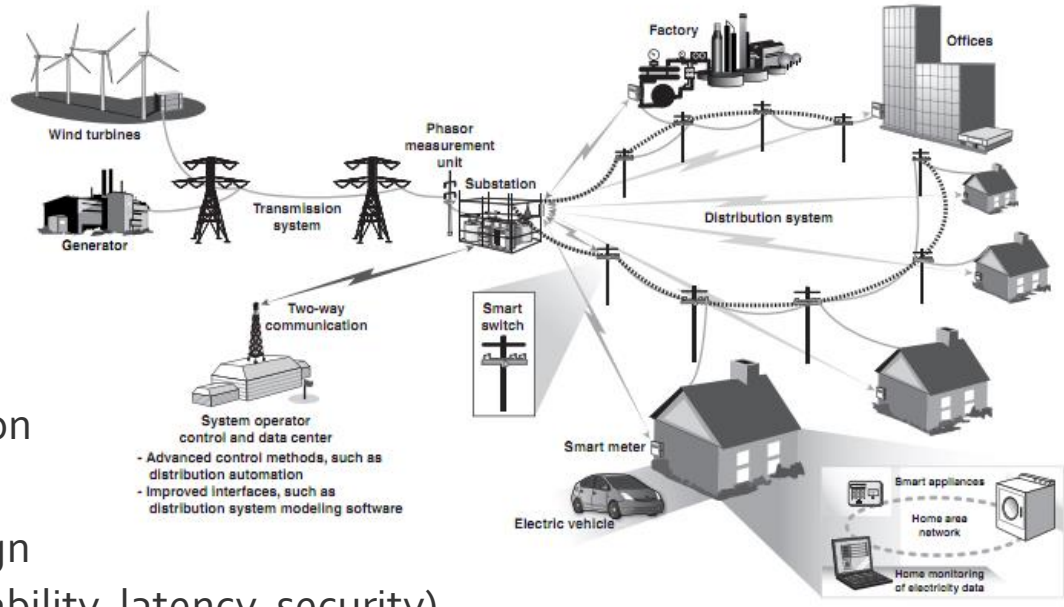
Our research in the context of 'Smart'

- Domains
  - **Smart Grids**
  - Smart buildings
- Research
  - **Monitoring and control**
    - Stream data processing
    - Big data anomaly detection
  - **Architecture design**
    - Smart infrastructure design
    - Quality optimization (reliability, latency, security)
  - **Modeling and simulation**
    - Analysis of what-if scenarios
    - Evaluation of design options, under uncertainty
  - **Visualization** – of surveillance data
  - **Persistence of large data** – and cloud computing



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Contractual research projects

- **Smart Grid in the Czech Republic**
  - Architecture and operation of **smart metering** (Automated Metering Management – AMM)
  - **Safe and secure AMM**
  - Projects of contractual research
    - Communication technologies
    - Labs and testing
    - Home devices (for smart homes)
- **Cybernic Proving Ground (KyPo)**
  - Project The Ministry of the Interior of the Czech Republic for 2 years, **opened in April 2015**
  - Cloud environment (CERIT-SC) for the **simulation of network security-related processes**
  - ICS MU, Department of security computer network
  - **Lasaris** – Visualization

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Strategic projects at MU – C4e

- **(OP VVV) Excellent research program – Czech Cybercrime Center of Excellence**
  - Three fields:
  - **Computer security < Lasaris (visualization)**
  - **Secure and safe design << Lasaris (leadership)**
  - **Law of secure societies**
- Key strategic partners
  - **University of Vienna**, Faculty of Informatics
    - Renate Motschnig, Gerald Quirchmayr, Stefanie Rinderle-Ma

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Strategic projects – CERIT Scientific Cloud

- **(OP VVV) Excellent research program – Scientific Cloud**
  - Upgrade of infrastructure
  - Two in-house research fields:
    - **BigData and large-scale computing architectures**
    - **High performance computing**
- Key researchers from Lasaris >> BigData, data quality
  - Barbora Bühnová
  - Bruno Rossi
  - Tomáš Pitner
  - Mouzhi Ge
  - Jan Herman

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Security studies at MU – all levels

- **Institutional Accreditation for MU – all levels (MSc., Ph.D.)**
  - C4e (FI, ICS, F of Law) + Faculty of Social Sciences
- **(OP VVV) PhD study program – Secure Knowledge Society**
  - **Secure societies**
- Master program – **Management of…**
  - … SW development
  - … Cybersecurity (critical infrastructures)
  - … Services

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CERIT Science Park

- **CERIT = Centre for Education, Research and Innovation in ICT**
- **CERIT Science Park**
  - Opened in **September 2014 at FI MU**
  - ICT Science Park and **Business Incubator**
  - Currently hosting **20 companies** – both start-ups and established ICT leaders
  - Managed by **CERIT Executive Unit** (8 people)
  - Supervised by the **Council for Industrial Cooperation**
- **Activities include**
  - Joint research, projects (CAES, LODIS)
  - Student projects and internships
  - Teaching in cooperation
  - Business breakfasts

cerit science park

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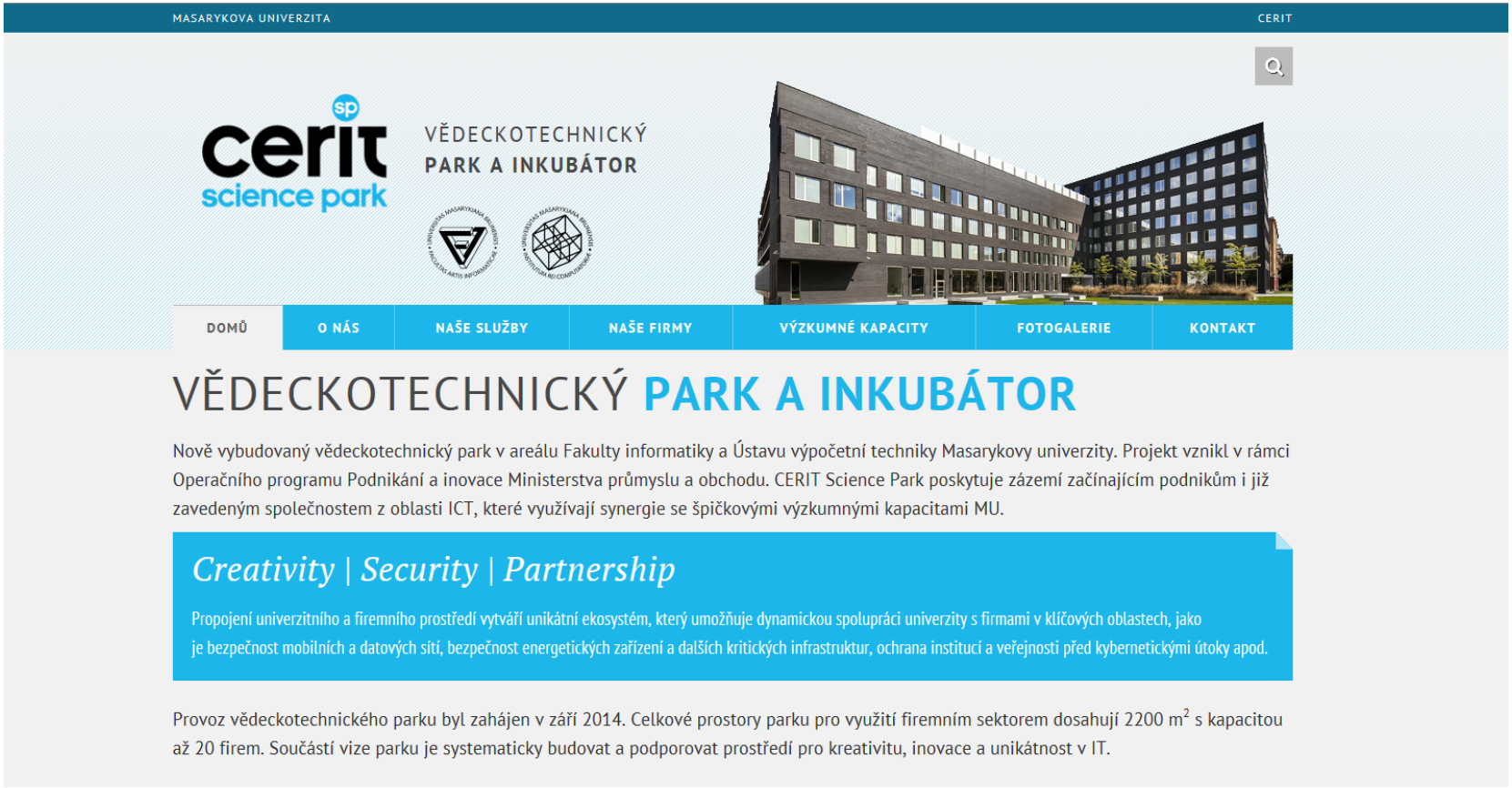
For more info see www.sciencepark.cz



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Innovation of Technology Transfer at MU

- **Technology-transfer Office**
  - **New ICT pillar** (CERIT-EU)
  - Roman Čermák, Tomáš Pitner, Nikola Šimková, Jan Rada, Veronika Bumbálková

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International Projects (proposals)

- H2020 in Cybersecurity
  - Call opened in 2018
  - Cybertrainings (at KyPo) for critical infrastructures
  - Collaboration C4e and ČEZd in CZ
  - Foreign partners from FI (TSO, Cyberarena), SE

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Domestic Projects (proposals)

- TAČR Théta program
  - Call closes now in Oct 2017
  - „Bezpečné virtuální elektrárny pro řízení soustavy a obchodní účely“

Activities for the Society

- **International Olympiads in Informatics**
  - **Great success 2016 Kazan, 2017 Tehran**
- **Central European Olympiads in Informatics 2015**
  - Secondary school students
  - Lead at MU: **Tomáš Pitner** and many more
- **Czech-Slovak-Polish Preparation Camp 2017**
- **Czechitas since 2016 at FI**
  - Secondary school students (young ladies)
  - Motivation for studying ICT
    - Seat in CERIT Science Park under negotiations
  - Lead at MU: **Bára Bühnová**

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