

# 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



# FI MU Research Competences

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**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**

# Industrial Cooperation at FI MU

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**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](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.

# Lab of SW Architectures and Information Systems

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- **History of LaSARIS**

- Established in **2009**
- Own premises since **2010**
- Located at Botanicka 68a, Brno

- **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), ...

- **Members**

- **4** academicians
- **10** PhD students
- **15+** undergraduate students

# Our research in the context of 'Secure'

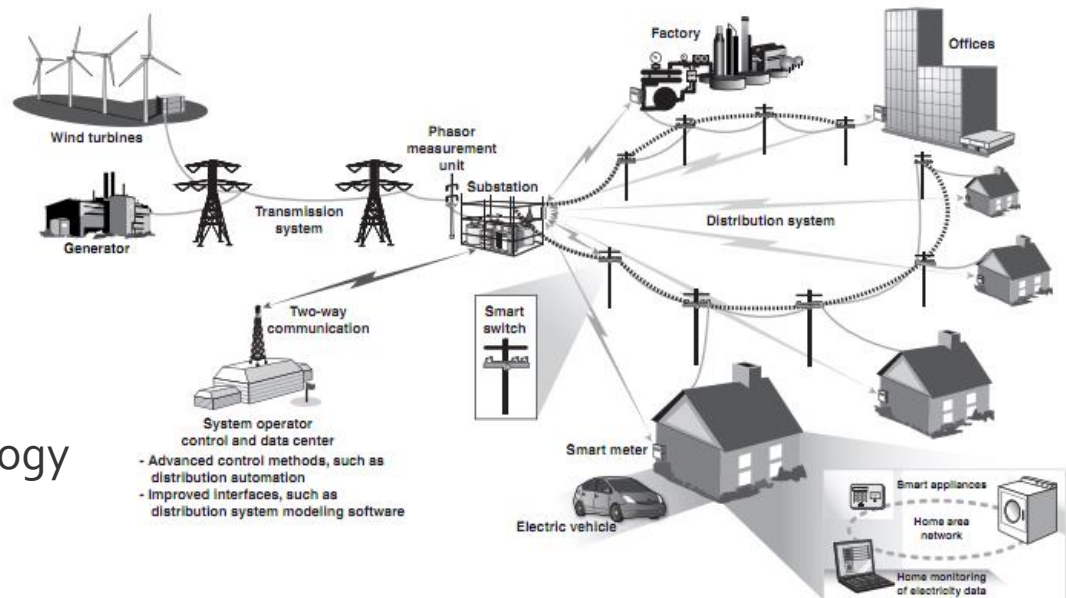
- Research

- **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**

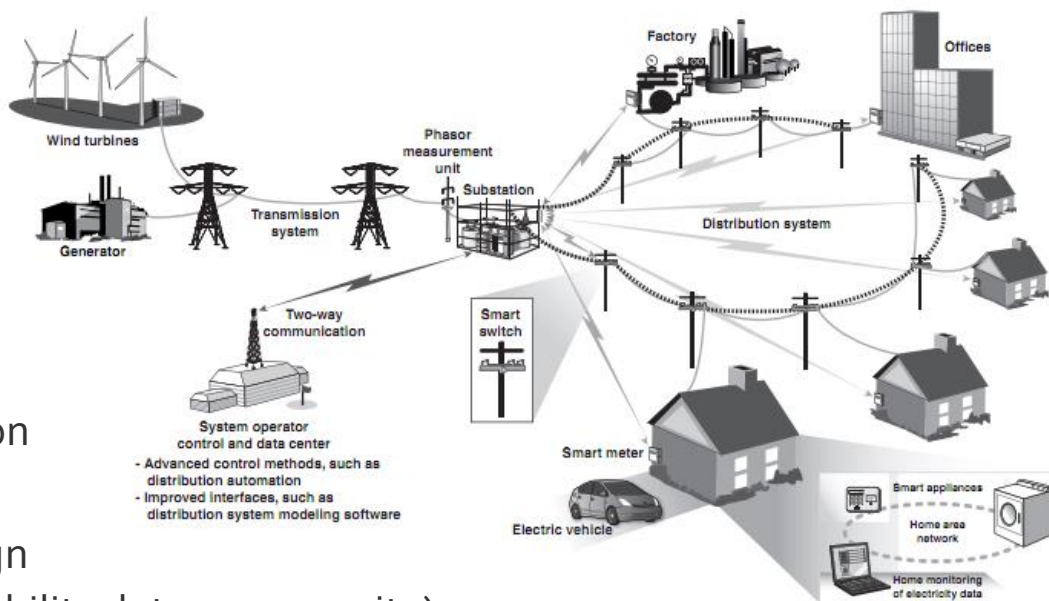
- Smart infrastructure design
- Quality optimization (reliability, latency, security)

- **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

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- **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







# Strategic projects at MU – C4e

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- **(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

# Strategic projects – CERIT Scientific Cloud

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- **(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 Bührenová
  - Bruno Rossi
  - Tomáš Pitner
  - Mouzhi Ge
  - Jan Herman

# Security studies at MU – all levels

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- **Institutional Accreditation for MU – all levels (MSc., Ph.D.)**
  - C<sub>4</sub>e (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

# CERIT Science Park

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- **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



For more info see [www.sciencepark.cz](http://www.sciencepark.cz)



The screenshot shows the homepage of the CERIT Science Park website. At the top, there is a dark blue header with 'MASARYKOVA UNIVERZITA' on the left and 'CERIT' on the right. Below the header, the main content area features the CERIT Science Park logo on the left, which includes the text 'cerit science park' and 'VĚDECKOTECHNICKÝ PARK A INKUBÁTOR'. To the right of the logo are two circular logos representing Masaryk University and the Faculty of Informatics. Further right is a large photograph of a modern, multi-story office building. Below the photograph is a navigation menu with six items: 'DOMŮ', 'O NÁS', 'NAŠE SLUŽBY', 'NAŠE FIRMY', 'VÝZKUMNÉ KAPACITY', and 'FOTOGALERIE'. Below the navigation menu is a large heading 'VĚDECKOTECHNICKÝ PARK A INKUBÁTOR'. Underneath the heading is a paragraph of text describing the park's location and purpose. A blue box contains the slogan 'Creativity | Security | Partnership' and a short paragraph about the university-business ecosystem. At the bottom, another paragraph provides details about the park's opening in 2014 and its capacity.

MASARYKOVA UNIVERZITA CERIT

**cerit** science park VĚDECKOTECHNICKÝ PARK A INKUBÁTOR

DOMŮ O NÁS NAŠE SLUŽBY NAŠE FIRMY VÝZKUMNÉ KAPACITY FOTOGALERIE KONTAKT

## VĚDECKOTECHNICKÝ PARK A INKUBÁTOR

Nově vybudovaný vědeckotechnický park v areálu Fakulty informatiky a Ústavu výpočetní techniky Masarykovy univerzity. Projekt vznikl v rámci Operačního programu Podnikání a inovace Ministerstva průmyslu a obchodu. CERIT Science Park poskytuje zázemí začínajícím podnikům i již zavedeným společnostem z oblasti ICT, které využívají synergie se špičkovými výzkumnými kapacitami MU.

*Creativity | Security | Partnership*

Propojení univerzitního a firemního prostředí vytváří unikátní ekosystém, který umožňuje dynamickou spolupráci univerzity s firmami v klíčových oblastech, jako je bezpečnost mobilních a datových sítí, bezpečnost energetických zařízení a dalších kritických infrastruktur, ochrana institucí a veřejnosti před kybernetickými útoky apod.

Provoz vědeckotechnického parku byl zahájen v září 2014. Celkové prostory parku pro využití firemním sektorem dosahují 2200 m<sup>2</sup> s kapacitou až 20 firem. Součástí vize parku je systematicky budovat a podporovat prostředí pro kreativitu, inovace a unikátnost v IT.

# Innovation of Technology Transfer at MU

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

# International Projects (proposals)

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- 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



# Domestic Projects (proposals)

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

# Activities for the Society

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- **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 Bührenová**