

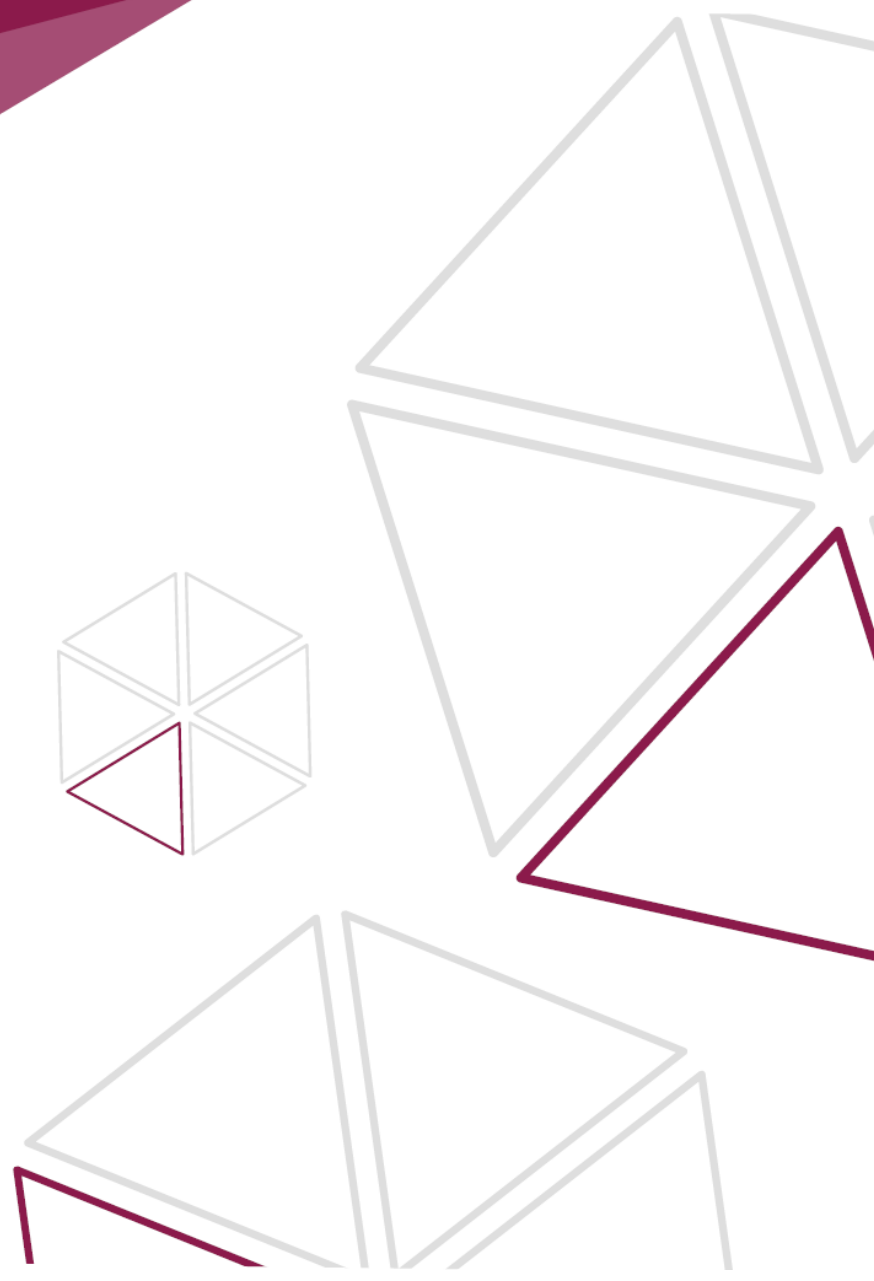


CRITIS 2018

The 13th International Conference on Critical
Information Infrastructures Security

PROGRAMME

24-26 September 2018
Kaunas, Lithuania



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Contents

.....

Preface 3

.....

Acknowledgements 4

.....

Organizers 8

.....

Programme 9

.....

Invited Speakers 13

.....

General information 19

.....

Preface

CRITIS 2018 continues the tradition of presenting innovative research and exploring new challenges in the field of critical (information) infrastructure protection (C(I)IP) and fostering the dialogue between all C(I)I stakeholders. CRITIS 2018 aims at bringing together researchers and professionals from academia, C(I)I operators, industry, defence sector and governmental organisations working in the field of the security of C(I)I.

As in previous years, invited speakers and special events will complement a programme of original research contributions. The conference organisers invite the different research communities and stakeholders involved in C(I)IP to attend and present their progress and encourage discussions and multi-disciplinary approaches to relevant C(I)IP problems.

The Projects Dissemination Session will be an opportunity of dissemination for ongoing European, multinational, and national projects. These presentations will not be submitted to the reviewing process and will not lead to any publication. The purpose of this activity is sharing ideas and experiences among scientist and experts working on different research and development projects in the C(I)IP domain.

Similarly, a session will be devoted to Industry working in the field of the security of C(I)I. CRITIS 2018 encourages Industry to share their innovative key achievements within 15 minute presentations in a special Industry session.

Besides, CRITIS 2018 conference has a special focus on current and future energy infrastructures within the special session "Energy infrastructure operators and stakeholders: key challenges and solution directions". Invited speakers for this special session will be from European electricity and/or gas Transmission System Operators (TSO), European electricity and gas Distributed System Operators (DSO), NATO, and European policy-makers.

Acknowledgements

We would like to thank many people for their support and contributions to the 13th International Conference on Critical Information Infrastructures Security (CRITIS 2018). We gratefully acknowledge the members of CRITIS Steering Committee, Programme Committee, Chairs and Co-Chairs.

We also thank Plenary Speakers of CRITIS 2018 offering to share their expertise in the field. We also thank all the authors of the contributed papers for their submissions and participation.

Finally, we thank the respective organisations for supporting the conference. CRITIS 2018 has been made possible by the Lithuanian Energy Institute working together with the support of Vytautas Magnus University.

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Organisers

Lithuanian Energy Institute

The Lithuanian Energy Institute was established in 1956. LEI is a technical research centre dealing with energy related research in renewable energy (wind, biomass), smart grids, analysis of security of energy supply, energy efficiency (modelling and consulting), simulation of complex energy systems, energy planning (municipal, regional, country, international level), nuclear safety and radioactive waste management, structural integrity assessment of components and structures, thermal physics and fluid mechanics, combustion engineering, hydrogen storage, plasma research, material research (accredited laboratory), metrology (accredited and notified laboratory), hydrology studies (modelling of hydrodynamic and sediment processes).
www.lei.lt



Vytautas Magnus University

Vytautas Magnus University was established in 1922 and re-established in 1989 in Kaunas, Lithuania. It is one of the most liberal and modern universities in Lithuania and recognized worldwide – ranked among top 800 universities by QS World University Rankings and U-Multirank Ranking. At present, there are 10 faculties at VMU: Arts, Catholic Theology, Economics and Management, Humanities, Informatics, Law, Natural Sciences, Political Sciences and Diplomacy, Social Sciences, Music Academy, over 7,500 students of 50 nationalities and over 480 members of academic staff. Vytautas Magnus University is the city's hub of academic, scientific and cultural activities, distinguished by its liberal education system (Artes Liberales), humanist spirit, cultivation of creativity and opportunities for wider, more universal enlightenment.
www.vdu.lt/en/



VYTAUTAS
MAGNUS
UNIVERSITY
M C M X X I I

Programme

Travel day, Sunday, 23 September 2018

17.00 – 20.00 **Reception & Welcome Cocktail**
In Kaunas Town hall (Rotušės a. 1, Kaunas)

Venue: Vytauto Didžiojo universitetas (Vytautas Magnus University)
S. Daukanto g. 28 (Small Hall, 2nd floor), Kaunas

1st day, Monday, 24 September 2018

08.30 – 09.00 **Registration**

09.00 – 09.20 **Welcome to participants**

09.20 – 10.00 **PLENARY SESSION: t.b.a.**
Chair: Bernhard Hämmerli

10.00 – 11.00 **SESSION 1: Advanced Analysis of Critical Energy Systems**
Chair: Simin Nadjm-Tehrani
Node importance analysis of a gas transmission network with evaluation of a new infrastructure by ProGasNet
Pavel Praks and Vytis Kopustinskas
In-Cycle Sequential Topology Faults and Attacks: Effects on State Estimation
Ammara Gul and Stephen D. Wolthusen * Young CRITIS Award (YCA) candidate*
Health Monitoring of Critical Power System Equipments using Identifying Codes
Kaustav Basu, Malhar Padhee, Sohini Roy, Anamitra Pal, Arunabha Sen, Matthew Rhodes and Brian Keel

11.00 – 11.30 **Coffee Break**

11.30 – 12.50 **SESSION 2: Strengthening Urban Resilience**
Chair: Erich Rome
Computer-aided Security Life Cycle Management for Critical Systems
Florian Patzer, Ankush Meshram, Pascal Birnstill, Christian Haas and Jürgen Beyerer

A Measure for Resilience of Critical Infrastructures
Sandra König, Thomas Schaberreiter, Stefan Rass and Stefan Schauer

Earthquake simulation on urban areas: improving contingency plans by damage assessment
Antonio Di Pietro, Vittorio Rosato, Maurizio Pollino, Gregorio D'Agostino, Luigi La Porta, Sonia Giovinazzi, Aldo Fabiani and Alberto Tofani

IVAVIA: Impact and Vulnerability Analysis of Vital Infrastructures and Built-Up Areas
Erich Rome, Oliver Ullrich, Daniel Lückerrath, Jingquan Xie, Rainer Worst and Manfred Bogen

12.50 – 14.00 **Lunch**

14.00 – 14.40	<p>SESSION 3: Securing Internet of Things and Industrial Control Systems <i>Chair: Sokratis K. Katsikas</i></p> <p>SMuF: State Machine Based Mutational Fuzzing Framework for Internet of Things <i>Neeraj Karamchandani, Vinay Sachidananda, Suhas Setikere, Jianying Zhou and Yuval Elovici</i></p> <p>Leveraging Semantics for Actionable Intrusion Detection in Building Automation Systems <i>Davide Fauri, Michail Kapsalakis, Daniel Ricardo Dos Santos, Elisa Costante, Jerry Den Hartog and Sandro Etalle</i></p>
14.40 – 15.30	<p>>> <i>Short papers: seeking your inputs and dialogue</i></p> <p>Anon-1: Building a National Testbed for Research and Training on SCADA Security <i>Magnus Almgren, Peter Andersson, Gunnar Björkman, Mathias Ekstedt, Jonas Hallberg, Simin Nadjm-Tehrani and Erik Westring</i></p> <p>On Cyber Security and Digital Twins for Critical Infrastructures: Risks and Opportunities <i>Mislav Findrik and Paul Smith</i></p> <p>Efficient Analysis to Protect Control into Critical Infrastructures <i>Shuo Zhang</i></p> <p>Denial of Service Attacks: Detecting the frailties of machine learning algorithms in the Classification Process <i>Ivo Frazão, Pedro Abreu, Tiago Cruz, Helder Araújo and Paulo Simões</i></p>
15.30 – 16.00	Coffee Break
16.00 – 17.30	<p>POSTER TALKS <i>Chair: t.b.a.</i></p>
17.30 – 19.00	POSTER SESSION

2nd day, Tuesday, 25 September 2018

09.00 – 09.40

KEYNOTE LECTURE

Chair: Grigore Havarneanu

Bridging the gap between ICS and corporate IT security: Finding common culture and views

Dr. Stefan Lüders (Head of Computer Security at CERN, Switzerland)

10.00 – 11.00

SESSION 4: Need and tool sets for Industrial Control System security

Chair: Grigore Havarneanu

Cybersecurity Self-assessment Tools: Evaluating Importance for Securing Industrial Control Systems in Critical Infrastructures

Georgia Lykou, Argyrw Anagnostopoulou, George Stergiopoulos and Dimitris Gritzalis

Gathering Intelligence through Realistic Industrial Control System Honeypots - A real-world Industrial Experience Report

Óscar Navarro, Servilio Alonso, Joan Balbastre and Stefan Beyer

A Comparison of ICS Datasets for Security Research based on Attack Paths

Seungoh Choi, Jeong-Han Yun and Sin-Kyu Kim

11.00 – 11.30

Coffee Break

11.30 – 12.50

SESSION 5: MS&A - Advancements in governance and resilience of Critical Infrastructures

Chair: Marianthi Theocharidou

PPP(Public-Private Partnership)-based Cyber Resilience Enhancement Efforts for National Critical Infrastructures Protection in Japan-2

Kenji Watanabe

Governance Models Preferences for Security Information Sharing: An Institutional Economics Perspective for Critical Infrastructure Protection

Alain Mermoud, Marcus Matthias Keupp and Dimitri Percia David

Conceptual Framework for Hybrid Situational Awareness in Critical Port Infrastructures

Stefan Schauer, Benjamin Rainer, Nicolas Museux, David Faure, Federico Jesús Carvajal Rodrigo, Javier Hingant Gómez, Stefan Beyer, Rafael Company Peris and Sergio Zamarripa Lopez.

Discovering Vulnerabilities in Heterogeneous Interconnected Systems

*Luca Faramondi *, Gabriele Oliva, Stefano Panzieri and Roberto Setola*

** Young CRITIS Award (YCA) candidate*

12.50 – 14.00

Lunch

14.00 – 16.00

INVITED SESSION 1: Energy Operators and Stakeholders (technologies)

Chair: Marcelo Masera

Title of the presentation t.b.a.

Daivis Virbickas (CEO, European Commission Expert, Litgrid, Lithuania)

Title of the presentation t.b.a.

Eryk Kłossowski (CEO, President of the Management Board of PSE S.A, PSE S.A, Poland)

Building a network of trust among European utilities to foster proactive security though info sharing

Massimo Rocca (Enel Security representative and EE-ISAC Chair, Enel, Italy)

Securing BKW's Electrical Power Production and Distribution: A 3D Approach to Cyber Threats

Ivo Maritz (Head, Cyber Security (CSO/CISO), BKW Group, Switzerland)

16.00 – 16.30 Coffee Break

16.30 – 18.00 INVITED SESSION 2: Energy Operators and Stakeholders (policy issues)

Chair: Marcelo Masera

Title of the presentation t.b.a.

Žygimantas Vaičiūnas (Minister, Ministry of Energy of the Republic of Lithuania)

Implications of political and policy decisions to energy security

Einari Kisel (Regional Manager for Europe, World Energy Council, Estonia)

Title of the presentation t.b.a.

Artūras Petkus (Head of Strategic Analysis Division, NATO ENSECOCOE, Lithuania)

Title of the presentation t.b.a.

Anna Samsel Van Haasteren (Security of supply unit, Team leader, EC DG ENER)

20.00 Conference Dinner

3rd day, Wednesday, 26 September 2018

09.00 – 09.40 KEYNOTE LECTURE

Chair: t.b.a.

10.00 – 11.00 Projects Dissemination Session

Chair: Bernhard Hämmerli

11.00 – 11.30 Coffee Break

11.30 – 12.30 Projects Dissemination Session

Chair: Bernhard Hämmerli

12.30 – 12.50 SESSION: Young CRITIS Award

Chair: Marco Santarelli

12.50 – 13.00 Farewell and thank you

13.00 – 14.00 Lunch

Invited Speakers

Tuesday, 25 September 2018: 09.00 – 09.40

Bridging the gap between ICS and corporate IT security: Finding common culture and views

Stefan Lüders

Head of Computer Security at CERN, Switzerland

The Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN) is a unique one-off prototype within the particle physics community. The accelerator itself and its attached experiments are development, managed and operated from a world-wide community of physicists, engineers and technicians. In parallel, CERN serves as a university-like campus for this community and provides the IT environment for massive data storage, computing clusters and any other service needed to enable collaboration and research. As such, "one-off prototype" and "world-wide community" plus the general attitude of an academic environment present particular challenges in securing CERN's data centres, the office networks and the multitude of different control systems deployed for running the LHC and its experiments.

Stefan Lüders, PhD, graduated from the Swiss Federal Institute of Technology in Zurich and joined CERN in 2002. Since 2009, he is heading the CERN Computer Security Incident Response Team as CERN's Computer Security Officer with the mandate to coordinate all aspects of CERN's computer security – office computing security, computer centre security, GRID computing security and control system security – whilst taking into account CERN's operational needs. Dr. Lüders has presented on computer security and control system cyber-security topics at many different occasions to international bodies, governments, and companies, and published several articles.



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Tuesday, 25 September 2018: 14.00 – 14.30

< title of the presentation t.b.a.>

Daivis Virbickas

CEO, European Commission Expert, Litgrid, Lithuania

< summary of the presentation >



CEO of Litgrid since October 2013, Daivis Virbickas has a long-term experience in developing and managing transmission system strategies, implementing international energy projects, electricity market analysis and business management. Daivis Virbickas is also European Commission expert on electricity interconnection targets. Daivis Virbickas holds a master degree in Energy Systems Management from Kaunas University of Technology (KTU), Corporate governance certificate from Baltic Management Institute and IMD Business School and a Certificate of Professional Board Member from Baltic Institute of Corporate Governance.

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Tuesday, 25 September 2018: 14.30 – 15.00

< title of the presentation t,.b.a.>

Eryk Kłossowski

CEO, President of the Management Board of PSE S.A, PSE S.A, Poland

< summary of the presentation>

Eryk Kłossowski graduated from the Faculty of Law and Administration and the Post-graduate Intellectual Property Law Studies at the University of Warsaw. In 2005, completed barrister training at Warsaw Bar Chamber. Worked with law firms until 2015. Involved with Ernst & Young in 2000-2003. Expert at the Jagiellonian Institute in 2011-2012. President of the Security-Development-Energy Initiatives Foundation since 2014. Lecturer to post-graduate students at Collegium Civitas, Warsaw University of Technology and Helena Chodkowska University of Technology and Economics. Specialised primarily in energy law and European competition law.



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Tuesday, 25 September 2018: 15.00 – 15.30

Building a network of trust among European utilities to foster proactive security through info sharing

Massimo Rocca

Enel Security representative and EE-ISAC Chair, Enel, Italy

The private operators have a reduced self-sufficiency when facing threats aimed to compromise the critical infrastructures due, for example, to limited resources, legal implications and variable capability to influence provider's roadmap to obtain secure by design solutions. To overcome these gaps, operators must act proactively: cooperate with each other, with institutions and authorities in terms of info sharing, simulations, joint programs and trainings. EE-ISAC is a no profit association founded by Enel and other European utilities with the aim to build a trusted community, where the members can discuss on threats and vulnerabilities that are affecting their infrastructures and cooperate in building awareness and security culture dissemination. EE-ISAC is the outcome of Distributed Energy Security Knowledge (DENSEK), a CIPS European project launched in 2012. The presentation will illustrate the achievements of the association and its perspective fostering critical infrastructure resilience.

Massimo Rocca is a cyber security expert and the Head of Enel's Security Processes, systems and planning unit. Based in Italy, he participates to several national and international working groups on critical infrastructure protection and coordinates the multinational's security activities in more than 40 Countries. Leveraging on this visibility, he sponsored the development of a cooperation network to assist other security managers from the utilities; in few years, it became the first European Energy - Information Sharing and Analysis Center.



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Tuesday, 25 September 2018: 15.30 – 16.00

Securing BKW's Electrical Power Production and Distribution: A 3D Approach to Cyber Threats

Ivo Maritz

Head, Cyber Security (CSO/CISO), BKW Group, Switzerland



The BKW Group is a Bern-based international energy and infrastructure company with more than 6,500 employees. The Group plans, builds and operates infrastructure to produce and supply energy to businesses, households and the public sector. In addition, it offers engineering of energy, infrastructure and environmental projects, building technology planning, installation and maintenance as well as the construction, servicing and maintenance of energy, telecommunications, transport and water networks. To protect its IT and OT infrastructures, BKW runs a three year program addressing Cyber Security with a three dimensional approach: Creating Awareness and Acceptance, fully implementing IT, OT and PHY Protection and improving Resilience and Reaction.

After his studies in Civil Engineering at ETH Zurich Ivo Maritz was an Assistant in Computer Science and then the Deputy Manager of the newly founded Informatics Services at the University of Berne. After a station with one of the large Swiss Banks, he held different ICT leadership positions with a global Pharmaceutical Corporation headquartered in Basel during 11 years. Thereafter he ran Engineering and Operations as the CTO and COO of a Swiss Telecom Carrier providing B2B and B2B2C services. Before joining BKW in 2014, Ivo led the ICT Infrastructure Organization of a globally operating Machinery Industry group. With the BKW Group Ivo served as its CIO, leading the ICT Business Unit with 160 employees. He initialized the next steps of the digital transformation of the company on the IT side. Since the beginning of 2017, Ivo leads primarily the Cyber Security Program of the BKW Group as its CSO/CISO.

BKW is a Berne-based international energy and infrastructure services corporation with more than 6,500 employees.

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Tuesday, 25 September 2018: 16.30 – 17.00

Implications of political and policy decisions to energy security

Einari Kisel

Regional Manager for Europe, World Energy Council, Estonia

Energy sector is going through a number of parallel transitions in terms of technologies, market designs, business models and resilience. An energy policy has to guarantee in parallel with energy security also sustainability and affordability of energy supplies. The presentation will focus on several examples from Europe, where political or policy framework has supported or hindered those transitions, especially in terms of energy security. It also takes a look into coming future by analysing what trends and developments are likely to influence the power sector of Europe in the coming decade in terms of energy security.



Dr. Einari Kisel is the Regional Manager for Europe in the World Energy Council Secretariat. He is responsible for the development of relations with all European Member Committees, companies and institutions. In 2017 he was also nominated to act as a Member of Supervisory Board of Eesti Energia AS, Estonian energy utility. Before joining WEC Secretariat in 2012, he was engaged for 10 years as the Undersecretary of State for Energy (until 2008 as the Director of Energy Department) in the Ministry of Economic Affairs and Communications of Estonia, being responsible for all energy policy affairs of the state. Until 2002 he worked for 7 years in the Estonian energy utility Eesti Energia, where his last duty was the appointment as the Director of Trade. He has received PhD degree in Power Engineering, and Master degrees in Thermal Engineering and in Business Administration from Tallinn University of Technology.

General information

Conference venue

Vytauto Didžiojo universitetas (Vytautas Magnus University)
S. Daukanto g. 28 (Small Hall, 2nd floor), goo.gl/IUk03p
Kaunas, Lithuania

Kaunas is the second-largest city in Lithuania and has historically been a leading centre of Lithuanian economic, academic, and cultural life. Kaunas was the biggest city and the centre of a county in the Trakai Municipality of the Grand Duchy of Lithuania since 1413.

Kaunas is unique place since it has the oldest funiculars in the world. Kaunas is surrounded by old fortification system (now the castle are used for cultural activities, as museums). Kaunas has the best example of high Baroque in Northern and Eastern Europe – “Pažaislis” Church and Monastery Ensemble; and has the longest pedestrian street in Eastern Europe – “Laisvės alėja”.

An old legend claims that Kaunas was established by the Romans in ancient times. These Romans were supposedly led by a patrician named Palemon, who had three sons: Barcus, Kunas and Sperus. Palemon fled from Rome because he feared the mad Emperor Nero. Palemon, his sons and other relatives travelled all the way to Lithuania. After Palemon's death, his sons divided his land. Kaunas got the land where Kaunas now stands. He built a fortress near the confluence of the Nemunas and Neris rivers, and the city that grew up there was named after him. There is also a suburban region in the vicinity named "Palemonas".

Kaunas is first mentioned in written sources in 1361 when brick Kaunas Castle was constructed. In 1362, the castle was captured and destroyed by the Teutonic Order. The Kaunas castle was rebuilt at the beginning of the 15th century.

In 1408, the town was granted Magdeburg Rights by Vytautas the Great and became a centre of Kaunas Powiat in Trakai Voivodeship in 1413. Vytautas ceded Kaunas the right to own the scales used for weighing the goods brought to the city or packed on site, wax processing, and woollen cloth trimming facilities. The power of the self-governing Kaunas was shared by three interrelated major institutions: vaitas (the Mayor), the Magistrate (12 lay judges and 4 burgomasters) and the so-called Benchers' Court (12 persons). Kaunas then began to gain prominence, since it was at an intersection of trade routes and a river port. In 1441 Kaunas joined the Hanseatic League, and a Hansa merchant office called 'Kontor' was opened — the only one in the Grand Duchy of Lithuania. By the 16th century, Kaunas also had a public school and a hospital and was one of the best-formed towns in the whole country.

After the final partition of the Polish–Lithuanian state in 1795, the city was taken over by the Russian Empire and became a part of Vilna Governorate. During the French invasion of Russia in 1812, the Grand Army of Napoleon passed through Kaunas twice, devastating the city both times.

Kaunas is also the seat of the Roman Catholic Archdiocese of Kaunas.

Modern Kaunas has close links with critical infrastructures. It is an important railway hub in Lithuania and city of the crossroads of international air transport (Kaunas airport) and road transport (Via Baltic, Rail Baltic). The Kaunas Hydroelectric Power Plant, located near the Nemunas River, is producing electricity for Kaunas city.

Kaunas is often referred to as a city of students and basketball, often called as the second religion of Lithuania.

<http://visit.kaunas.lt/en/>

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Guidelines for presenters and session chairs

Each presentation has been allocated 15 minutes, with an additional 5 minutes for discussion. Please keep to the scheduled times so that the conference can run smoothly and participants can attend the talks they wish to see. Session chairs have been asked to keep exactly to the timetable.

Presenters should upload their presentation onto the presentation computer at the latest during the break before their session using a USB memory device. The presentation computer has the CRITIS 2018 directory structure that corresponds to the session location, day and time.

This computer is running the Windows operating system, and is preloaded with Windows 10, Powerpoint 2016 and Adobe Acrobat Reader software to display PowerPoint and PDF files. No other file formats are supported.

Presenters are strongly discouraged from using their own computers and should do so only in exceptional cases. Changing computers takes time away from other presenters and valuable discussions. In these special cases, presenters should verify that their presentation works by connecting their device to the projector in the room where they will present and trying their presentation out before their session. Conference staff will be there during the breaks to help.

Presenters should meet the Session Chair during the break before the session. They are encouraged to provide a very short (a couple of lines) written biographical statements to the Session Chair in advance.

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Discussion and time keeping

Session Chairs have the responsibility to introduce the speakers, to lead the discussions, and to ensure that the session schedule is observed. Every effort should be made to keep to the 20-minute total time allocation for each presenter, in order that the next talk starts on time.

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Internet access

A free WiFi network is available. Login details will be provided to participants at the reception desk.

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Language

The official Language of CRITIS 2018 conference is English.

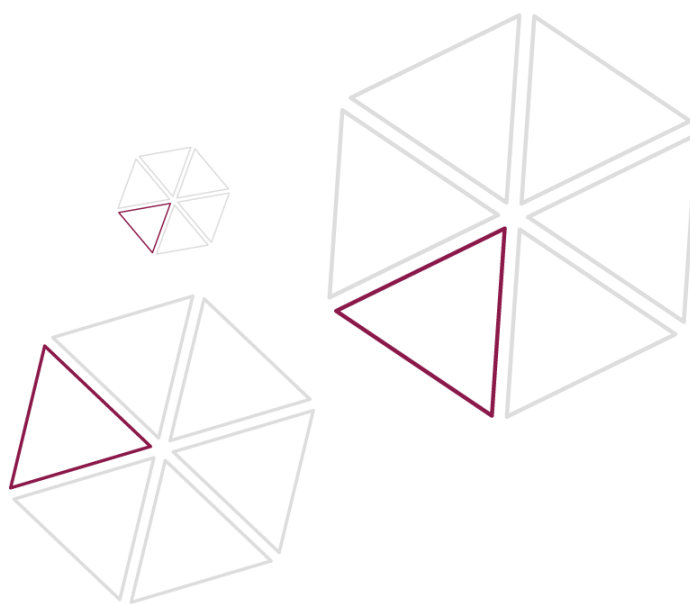
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Emergencies

In case of an emergency during the conference, the organising committee can be contacted at +37067083955 phone. For other inquiries before and during the conference use the contact information below.

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For your notes



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CRITIS 2018 Conference Venue

Vytautas Magnus University
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