

**31th International Conference on
Information Technologies – InfoTech-2017
(virtual e-conference)**

20-21 September 2017
Sofia, Bulgaria

***PRELIMINARY
PROGRAM***

*The forum is organized in the frame of
“Days of the Science of Technical University-Sofia, 2017”*

InfoTech-2017 is organized and supported by:

**Technical University of Sofia
(Scientific and Research Sector)**

Web site: <http://www.tu-sofia.bg>



**Union of Electronics, Electrical
Engineering and Communications**

Web site: <http://ceec.fnts-bg.org>



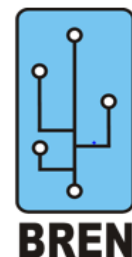
Union of Scientists in Bulgaria

Web site: <http://www.usb-bg.org>



**Association
Bulgarian Research and Education
Network**

Web site: <http://www.bren.bg>



Lirex BG

Web site: <http://www.lirex.bg>



**Institute of Electrical and Electronics
Engineers, Section Bulgaria**

Web site: <http://www.ieee.bg>



E-Conference InfoTech-2017 is an event of:

- ◆ **Faculty of Applied Mathematics and Informatics of TU-Sofia
(Department of Informatics)**
- ◆ **College of Energy and Electronics at TU-Sofia
(Department of Electronics, Computer Systems and Technologies)**



International Program Committee

Prof. Dencho BATANOV, Ph.D.	(Thailand)
Prof. Francesco BERGADANO	(Italy)
Prof. Dumitru Dan BURDESCU, Ph.D.	(Romania)
Assoc. Prof. Vassil FOURNADJIEV, Ph.D.	(Bulgaria)
Prof. Vangel FUSTIK, D.Sc.	(Macedonia)
Assoc. Prof. V. GAYOSO MARTÍNEZ, Ph.D.	(Spain)
Prof. Iliya GEORGIEV, Ph.D.	(USA)
Assoc. Prof. Alaine M. GUIMARÃES, Ph.D.	(Brazil)
Prof. Luis HERNÁNDEZ ENCINAS, D.Sc.	(Spain)
Prof. Atanas ILIEV, Ph.D.	(Macedonia)
Assoc. Prof. Ivan JELINEK, Ph.D.	(Czech Republic)
Dr. Karl O. JONES	(UK)
Dr. Zeashan H. KHAN	(Pakistan)
Prof. Dong Hwa KIM, Ph.D.	(Korea)
Prof. Karol MATIAŠKO, Ph.D.	(Slovakia)
Assoc. Prof. Brojo MISHRA, Ph.D.	(India)
Assoc. Prof. Jezabel MOLINA-GIL	(Spain)
Assoc. Prof. Irina NONINSKA, Ph.D.	(Bulgaria)
Prantosh Kumar PAUL, Ph.D.	(India)
Prof. Evelina PENCHEVA, D.Sc.	(Bulgaria)
Prof. Goran RAFAJLOVSKI, Ph.D.	(Macedonia)
Prof. Radi ROMANSKY, D.Sc. (<u>Chairman</u>)	(Bulgaria)
Prof. Leon ROTHKRANTZ, D.Sc.	(The Netherlands)
Assoc. Prof. Sudhir K. ROUTRAY, Ph.D.	(India)
Prof. Heather RUSKIN, Ph.D.	(Ireland)
Prof. Eugene SEMENKIN, D.Sc.	(Russia)
Prof. Radomir STANKOVIĆ, Ph.D.	(Serbia)
Prof. Ivan TASHEV, Ph.D.	(USA)
Assoc. Prof. Dimitar TSANEV, Ph.D.	(Bulgaria)
Prof. Kalum P. UDAGEPOLA, Ph.D.	(Australia)
Prof. Larissa ZAITSEVA, D.Sc.	(Latvia)

National Organizing Committee

Chairman: Radi ROMANSKY

Members: Angel POPOV, Dimitar TSANEV, Irina NONINSKA, Todor KOBUROV,
Elena PARVANOV, Desislava IVANOVA

Web site: <http://infotech-bg.com>

List of Registered Participants in InfoTech-2017	
---	--

Andreas Pescholl	Dr.-Ing., Haustechnik-Handels-GmbH (Germany)
Asen Toshev	Ph.D. student, Institute of Information and Communication Technologies – BAS (Bulgaria)
Desislava Ivanova	Assit. Prof., Ph.D., Eng., Dept. of Informatics, Technical University of Sofia (Bulgaria)
Georgios Christoforidis	Ph.D. student, Technical University of Sofia-Bulgaria (Greece/Scotland)
Igli Tafa	Assoc. Prof., Dr., Polytechnic University of Tirana (Albania)
Karl Jones	Ph. D., Dept. of Electronics and Electrical Engineering, Liverpool John Moores University (UK)
Krasimir Bozhinov	Dipl. Eng. Teacher, Math and Science School “Prof. Dr. Asen Zlatarov” (Bulgaria)
Leon Rothkrantz	Professor dr.h.c., Delft University of Technology (The Netherlands)
Meropy Themistokleous	CezanneHR, Glasgow (Scotland)
Mikhail Tsuranov	Senior Lecturer, Department of Computer Systems and Networks, National Aerospace University (Ukraine)
Nafees Ayub	Ph.D., Department of Computer Science, Government College University, Faisalabad (Pakistan)
Radi Romansky	Prof., D. Sc., Eng., Dept.of Informatics, Technical University of Sofia (Bulgaria)
Roumen Trifonov	Assoc. Prof., Ph.D., Eng., Head of IT in Industry Dept., Technical University of Sofia (Bulgaria)
Tatyana Ivanova	Assoc. Prof. Ph.D., College of Energy and Electronic at the Technical University of Sofia, (Bulgaria)
Tinatin Mshvidobadze	Prof., D.Sc., Gori University (Georgia) – NO REGISTRATION
Tzanko Tzolov	Member of Commission for Personal Data Protection, Sofia (Bulgaria)
Vangel Fustik	Prof. Dr., Faculty of EE and IT, University Ss. Cyril and Methodius, Skopje (Macedonia)
Vanya Markova	Institute of Robotics – BAS, Plovdiv (Bulgaria)
Vasil Furnadjiev	Assoc. Prof. Dr. Eng., New Bulgarian University, Sofia (Bulgaria)
Ventseslav Shopov	Institute of Robotics – BAS, Plovdiv (Bulgaria)
Vladimir Pevnev	Assoc. Prof., Ph. D., Department of Computer Systems and Networks, National Aerospace University (Ukraine)
Vyacheslav Kharchenko	Prof., D.Sc., Department of Computer Systems and Networks, National Aerospace University (Ukraine)

InfoTech-2017, 20-21 September 2017

Preliminary Scientific Program

Section 'A': Information Technologies

Software Technologies and Programming

[A-VF] SCRUM Methodology Compared with Other Methodologies Applied in the Software Development Projects

Vangel Fustik

Faculty of Electrical Engineering and IT- Skopje (Macedonia)

Business Intelligence, CRM- and ERP-Systems

[A-AT] Enhanced PSO Algorithm for Single-Objective Flexible Job Shop Scheduling Problems

Asen Tochev, Vassil Guliashki

Institute of ICT – BAS, Sofia (Bulgaria)

Section 'B': Information Security

[B-VP] *Invited paper (Key note):*

The Method of Data Assurance for Increasing IoT Infrastructure Security

Vladimir Pevnev, Yegor Novakov, Mikhail Tsuranov, Vyacheslav Kharchenko

National Aerospace University “KhAI”, Kharkiv (Ukraine)

Security Policy, Methods and Tools

[B-NA] An Authentication Mechanism to Manage Mobile Agents Along with Sensor Nodes to Improve Wireless Sensor Network Security

Nafees Ayub, Zubair Nabi, Naima Sabir

Government College University, Faisalabad (Pakistan)

Section 'C': Networking and Communication Technologies

[C-VF] *Invited paper (Key note):*

Design and Implementation of Data Centre (Case Study of New Bulgarian University)

Vassil Fournadjiev, Yonka Gancheva

New Bulgarian University, Sofia (Bulgaria)

[C-IT] Performance Comparison of the Different Streams in a TCP Bottleneck Link in the Presence of Background Traffic

Igli Tafa, Elijor Vila, Ezmerina Kotobelli, Alda Stefani, Jona Dushi
Polytechnic University of Tirana (Albania)

Cloud Computing (Cloud Services and Applications)

[C-AP] Integration of Cloud Services in the Selection Process of IT Solutions in Technical Wholesale

Andreas Pescholl
Haustechnik Handels-GmbH, Treuen (Germany)

Section 'D': Intelligent Systems and Applications**[D-LR] Invited paper (Key note):****Surveillance and Protection by Drones**

Leon Rothkrantz
Delft University of Technology / Czech TU in Prague
(The Netherlands / Czech Republic)

[D-KJ] Invited paper (Key note):**Comparison of Wild Dog Algorithm, Bat Algorithms and Biogeography Based Optimization**

Karl O. Jones, Tarek Zaibet, Grégoire Boizanté
Department of Electronics and Electrical Engineering, Liverpool John Moores University, Liverpool (UK)

Intelligent and Agent Systems

[D-RT] Dynamic Hierarchy in Decision-Making in Behaviour Selection of Mobile Robots

Roumen Trifonov, Galya Pavlova
Technical University of Sofia, Sofia (Bulgaria)

[D-VM] Graph Generation Approach for Agent Behaviour

Vanya Markova, Ventseslav Shopov
Institute of Robotics – BAS, Plovdiv (Bulgaria)

[D-VS] Evolutionary Graph-Based SLAM

Ventseslav Shopov, Vanya Markova
Institute of Robotics – BAS, Plovdiv (Bulgaria)

Knowledge-Based Applications

[D-DI] Mobile Application for Pattern Recognition Base on Machine Learning

Desislava Ivanova, Vladimir Kadurin
Technical University of Sofia, Sofia (Bulgaria)

Ontology and Semantic Web

[D-TI] Multilingual Ontologies and English-Bulgarian Ontology Development

Tatyana Ivanova
CEE at Technical University of Sofia, Sofia/Botevgrad (Bulgaria)

Section 'E': Technologies for System Design

Embedded Systems

[E-KB] STEM Project "MODULAIR" – an Investment in the Environmental Future

Krasimir Bozhinov; Martin Banov; Vladimir Stamenov; Georgi Dachev
Math and Science School "Prof. Dr. Assen Zlatarov", Botevgrad (Bulgaria)

Section 'F': Technological Aspects of e-Governance and Privacy

F1. Technological Aspects of e-Governance

[F-GC] An Approach to the Training of Medical Lab Technicians for the Efficient Use of Diverse IT Systems

Georgios Christoforidis¹, Meropi Themistokleous²
¹ Technical University of Sofia, ² Cezanne HR Software Developer
(Bulgaria/Greece/Scotland)

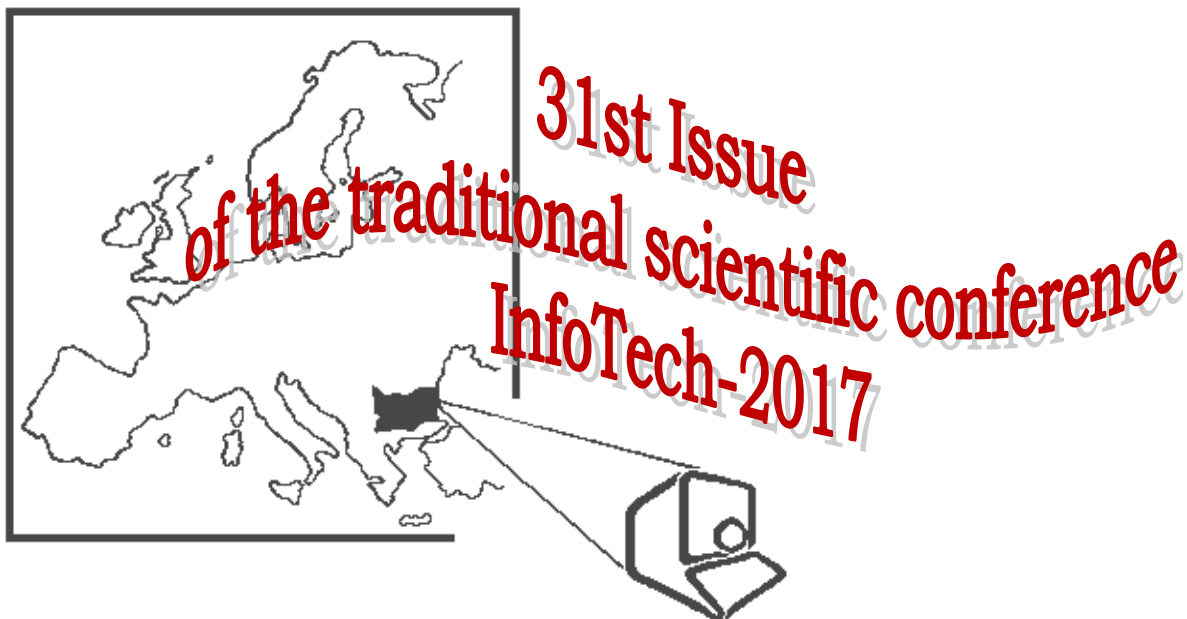
F2. Technological Aspects of Data Protection

[F-TT] Data Governance as a Business Technology and General Data Protection Regulation

Tzanko Tzolov
Member of the Commission for Personal Data Protection, Sofia (Bulgaria)

[F-RR] Opportunities of the Digital Space and Challenges for Privacy and Individual's Security

Radi Romansky
Technical University of Sofia, Sofia (Bulgaria)



InfoTech-2017 is organized with the support of:



Technical University of Sofia

8, Kl. Ohridski Str., Sofia 1000, BULGARIA

Web Site: www.tu-sofia.bg

Technical University of Sofia is a major educational research and development complex offering highly qualified trainers, engineers and technical staff, with modern laboratory facilities and considerable capacities for experimentation and production. TU-Sofia is the largest higher engineering school in Bulgaria with long years of experience in training engineers. Fifty five thousand are the engineers who have graduated and with the knowledge and skills acquired here have contributed to the development of Bulgarian industry.

TU-Sofia is a successor to the Higher Technical School in Sofia which opened doors in 1942 and which was renamed to State Polytechnic in 1945. It laid the foundations of four different higher institutes of education that exist to the present day and one of them is TU-Sofia established in 1953.

The structure of the TU-Sofia includes 14 faculties, several departments, one college (*College of Energy and Electronics*) and other units where students are trained and scientific research is conducted. The University has a branch in the city of Plovdiv with two faculties and a college and also an affiliated unit in the town of Sliven comprising one faculty and one college.

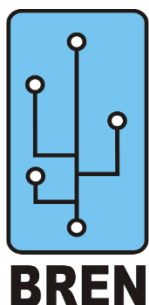
TU-Sofia trains specialists in degree engineering courses essential for the industrial development. Contemporary engineering trends in mechanical and electrical engineering, electronics, power generation, transport, automation, computer science and telecommunications, textile engineering, industrial management are taught at the Technical University. It also offers its students the opportunities of taking a degree course in engineering in a foreign language (German, English, French) and, in addition, a second degree course at the respective faculty; as well as further training at the Open Faculty. Over 800 highly qualified lecturers train the students in all educational-qualification and academic degrees: Professional Bachelor, Bachelor, Master, and PhD. The educational process provides high quality professional and language training which makes for its international recognition. All degree courses are accredited and continue to be part of the accreditation cycle of the National Evaluation and Accreditation Agency.

An important role for increasing the level of teaching, scientific and applied research activities of the Technical University of Sofia is played by the University's cooperation with large transnational companies such as Siemens, Eriksson, Microsoft, Daimler/Benz, etc.

The Technical University of Sofia enjoys close working relationships with more than 50 universities in Europe, Asia, North America and Africa. The University is a member of prestigious European and world organisations and participates in various projects under EU, UNESCO and NATO programmes. Owing to the diversity and high quality of the education it provides and the research activities it carries out the Technical University of Sofia is among the leading universities in the common educational and research area of united Europe.



InfoTech-2017 is organized with the support of:



Association Bulgarian Research and Education Network

6 Gurko Str.
1000 Sofia, Bulgaria
www.bren.bg

“Bulgarian Research and Education Network” (BREN) association is a non-profit legal entity, registered under the Non-profit Legal Entities Act.

BREN aims at deploying, developing, and operating the Bulgarian research and education networks, as well as facilitating the integration of Bulgarian educational, scientific, and cultural resources in the global information space.

BREN provides the Bulgarian Universities and scientific institutes with access to the pan-European and global research and education networks through high performance information infrastructure.

The aims of the Association are:

- to promote the development and management of research networks and the integration of Bulgarian educational, scientific and cultural resources in the world information society;
- to facilitate the participation of Bulgarian researchers, scholars, lecturers and students, as well as universities and other higher educational institutions in European and international projects, demanding access to high speed research infrastructure;
- to further stimulate the Bulgarian scientific community and all Bulgarian citizens to completely use pan-European and world scientific networks.

The means to reach the Association’s aims are:

- providing the universities, higher educational and scientific institutions with the necessary information infrastructure to develop and maintain research and other information networks;
- determining the conditions for joint activities of higher educational and scientific institutions with the information infrastructure and providing its connection to the pan-European research network;
- development and maintenance of virtual spaces (Internet portals) for exchange of information and ideas among research network users;
- providing help and participating in projects and activities, connected with the development of information technologies in Bulgaria and abroad;
- support to the education and qualification of researchers, students and specialists, working in the area of information technologies;
- providing help to the universities, educational and scientific institutions, offering education in the area of information and communication technologies.

InfoTech-2017 is organized with the support of:
--

**Lirex BG**

Mladost 3, Bl. 306, Sofia, BULGARIA

Web site: <http://www.lirex.bg>

Lirex.com companies (Lirex BG, Lirex BS, Lirex High Tech, Lirex Skopje) are leading suppliers of innovative IT solutions in Bulgaria and Macedonia. Due to the extensive experience in the information and communication field, the excellent team of specialists established long-term partner relationships with world-renowned companies – leaders in the IT world. We strive to add value to the business processes of our clients, and to enable them to achieve higher business goals through taking full advantage of the potential of advanced technologies.

We are committed to mastering information and communication innovations, and effectively applying them to attain measurable results for every client.

Quick facts:

- Over 20 years of experience in the IT field;
- Over 300 employees;
- Over 10 offices in cities throughout Bulgaria and Macedonia;
- Execution of some of the largest and most innovative projects in Bulgaria;
- ISO 9001:2008, ISO 20000-1:2005, ISO 27000:2005, и AQAP 2110 certified;
- Team of experts with over 500 certificates from our partners and global platforms and standards such as Unix, ITIL, etc.
- Over 20 world renowned partners, such as HP, Cisco, Microsoft, Fujitsu, Oracle, Xerox, Verint, Polycom, VMware, Blue Coat, LogLogic and others;
- International acknowledgements and awards: Video Project of 2007 and 2008 by Verint Inc. among all partners in Europe; Best partner for public sector projects for 2007 and Most Innovative Solutions for 2006 by Cisco among all partners in EMEA; Greatest Marketing Contributor among Plycom's partners in Europe for 2007; Cisco Systems Award in category "Development of integrated technology solutions" for 2010.



**Institute of Electrical and Electronics Engineers,
Inc. (Section Bulgaria)**

Web site: <http://www.ieee.bg>

A non-profit organization, **IEEE** is the world's leading professional association for the advancement of technology.

The **IEEE** name was originally an acronym for the Institute of Electrical and Electronics Engineers, Inc. Today, the universal nature of **IEEE**, as the diverse array of educators, engineers, scientists, innovators, leaders, entrepreneurs, and practitioners, exemplifies the mission of the **IEEE** of advancing technology for the benefit of humanity.

Through its global membership, **IEEE** is a leading authority on areas ranging from aerospace systems, computers and telecommunications to biomedical engineering, electric power and consumer electronics among others. Members rely on **IEEE** as a source of technical and professional information, resources and services. To foster an interest in the engineering profession, **IEEE** also serves student members in colleges and universities around the world. Other important constituencies include prospective members and organizations that purchase **IEEE** products and participate in conferences or other **IEEE** programs.

InfoTech-2017 is organized with the support of:

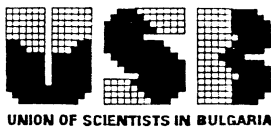


**Union of Electronics, Electrical Engineering
and Communication (CEEC)**

108, Rakovsky Str. Sofia 1000, Bulgaria
Web site: <http://www.ceec.fnts-bg.org>

CEEC is a non-governmental, non-political and non-profit professional association – part of the civil society, Member of the Federation of Scientific and Technical Unions in Bulgaria. Members of **CEEC** are more than 1200 graduated engineers, scientists from the Technical Universities and the Bulgarian Academy of Sciences, specialists and managers in factories and firms, students and post-graduate students, organized in clubs and national scientific-technical divisions, devoted to the electrical engineering industry, electronics, telecommunications, electromagnetic compatibility, acoustics etc. The collective members include more than 50 firms, establishments and organizations in this field.

CEEC publishes an authoritative scientific journal – “ELECTRICAL ENGINEERING AND ELECTRONICS” and Information Bulletin. The union organizes regular international and national scientific- technical events, such as the Int. Symp. on Electrical Apparatus and Technologies /“SIELA”/, the Int. Conf. on Electrical Machines, Drives and Power systems /“ELMA”/, the Int. Conf. “TELECOM”, the National Conf. with international participation on the Earth-Sun interaction, acoustics etc.



UNION OF SCIENTISTS IN BULGARIA

Union of Scientist in Bulgaria

39, Madrid Blvr. Sofia 1505, Bulgaria
Web site: <http://www.usb-bg.org>

The **USB** is a non-governmental organization (civil society organization) unifying 4000 members on a voluntary basis - scientists, higher education lecturers, experts working in all fields of science. It is a non-profit body registered according to the Bulgarian law for juridical persons.

The **USB** is structured around units, built on research-field and geographical-area principles: Sections (29) in Sofia and Branches (24) in the country. **USB** has also several corporate members – Bulgarian Scientific Societies. The **USB** headquarters are in the capital – Sofia, 6 more offices operate in the country. USB has its own printing house in Sofia.

USB owns and manages a conference centre on the Black Sea coast near Varna named the “*Fr. Joliot-Curie*” **International Home of Scientists (IHS)**. The building of the IHS is situated in a park, about 200m from the beach. It offers 5 meeting halls, 100 hotel rooms (with view to the sea and the park), restaurant (with summer terrace) and all facilities for meetings up to 300 people. More than 50 events are hosted annually.



Conference Proceedings Publishing and Dissemination

All accepted papers are reviewed by members of the International Program Committee and will be published in the PROCEEDINGS (ISSN 1314-1023) which will be deposited* in the libraries listed below:

Bulgaria	<ul style="list-style-type: none"> ◆ National Library "St. St. Cyril and Methodius", <i>Sofia</i> ◆ NACID – Central Research and Technical Library, <i>Sofia</i> ◆ Library of Technical University of Sofia, <i>Sofia</i> ◆ Library of International Business School, <i>Botevgrad</i>
Germany	<ul style="list-style-type: none"> ◆ Technische Informationsbibliothek und Universitätsbibliothek, <i>Hanover</i> ◆ Universitätsbibliothek, <i>Stuttgart</i> ◆ Universitätsbibliothek, <i>Kaiserslautern</i>
India	<ul style="list-style-type: none"> ◆ The Institution of Electronics and Telecommunication Engineers, <i>New Delhi</i>
Japan	<ul style="list-style-type: none"> ◆ National Diet Library, <i>Tokyo</i>
Republic of Moldova	<ul style="list-style-type: none"> ◆ Biblioteca Stiintifica Centrala a Academiei de Stiinte, <i>Chisinau</i>
Russia	<ul style="list-style-type: none"> ◆ Государственная публичная НТ библиотека (ГПНТБ), <i>Moscow</i> ◆ Всероссийский институт НТ информации (ВИНИТИ), <i>Moscow</i> ◆ Библиотека Российской АН (РАН), <i>Sanct Petersburg</i> ◆ ГПНТБ Сибирского отделения РАН, <i>Novosibirsk</i>
Spain	<ul style="list-style-type: none"> ◆ Centro de Informacion y Documentacion Cientifica (CINDOC), <i>Madrid</i>
USA	<ul style="list-style-type: none"> ◆ The Library of Congress, <i>Washington DC</i>

* with the support of National Centre for Information and Documentation (NACID) – Central Research and Technical Library, **Bulgaria**
(<http://mail.nacid.bg/newdesign/en/index.php>)



- ◆ The PROCEEDINGS of the International Conference on Information Technologies (InfoTech) is indexed by **EBSCO Publishing Inc.**, Ipswich, MA, USA (<http://www.ebsco.com>).
- ◆ Electronic version of the Conference PROCEEDINGS will be included in two specialized scientific databases of **EBSCO Publishing Inc.**, Ipswich, MA, USA (<http://www.ebscohost.com/title-lists>)
 - **Academic Search Complete (Other Sources)**
<http://www.ebscohost.com/titleLists/a9h-other.pdf> - see page 11 (August 2016)
 - **Academic Search Elite (Other Sources)**
<http://www.ebscohost.com/titleLists/afh-other.pdf> - see page 13 (August 2016)
 - **Computers & Applied Sciences Complete (Database Coverage List)**
<http://www.ebscohost.com/titleLists/iih-coverage.pdf> - see page 25 (August 2016)