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# ***Recent Advances in Information Science***

***Proceedings of the 7<sup>th</sup> European Computing Conference (ECC '13)***

***Dubrovnik, Croatia, June 25-27, 2013***

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Prof. Damir Boras, University of Zagreb, Croatia  
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**Preface**

This year the 7th European Computing Conference (ECC '13) was held in Dubrovnik, Croatia, June 25-27, 2013. The conference provided a platform to discuss network architecture, wireless networks, digital broadcasting, software engineering, information security, quantum cryptography, process management, emulation and debugging, programming languages, mobile computing, distributed real time systems etc with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors





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## Plenary Lecture 1

### Exploratory Study on the IT Governance Usage in Leading Croatian Companies



#### Professor Mario Spremić

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**Abstract:** Despite the financial crisis and ongoing need for cost cutting, companies all around the world heavily invest in information systems (IS) and underlying information technology (IT). Information systems (IS) plays very important role in modern business organizations supporting its organizational efficiency or, under certain circumstances, fostering business model innovation and change. IS can influence organization competitiveness in two ways: supporting operational efficiency (IS as a main infrastructure for the current business), or differentiating business through business model innovation and business process change. In either way IS becomes very important to the business and needs to be aligned with strategic objectives in order to justify massive investments. A number of studies (Weill and Ross (2004), Groznik et. al (2003), Spremić (2002)) showed that investments in IS and underlying IT resulted in added business value if they are truly connected with strategic business objectives. In that sense proliferation of governance of enterprise IT helps companies manage, or rather, govern IS as a primary business function with executive management involved in making decision about IS and IT. The quality of IT governance is rising with the large number of decisions about IS made by executive management, not IT departments. The more executive management is engaged in making decision about IS and IT, the IT governance is of better quality. In this paper the practice of governing the enterprise IT will be investigated on a sample of the largest 100 Croatian companies. Research questions posed here will reveal if there are some formal IT governance mechanisms, are there any differences in perceived role of IS and IT between CIOs (Chief Information Officers) and CEOs (Chief Executive Officers) of the sampled companies and what are the mechanisms to govern massive investment in enterprise IT.

**Brief Biography of the Speaker:** Mario Spremić is Full Professor and a head of the Department of Informatics at the Faculty of Economics & Business, University of Zagreb, Croatia. He received a B.Sc. in Mathematical Sciences, M.Sc. in IT Management and Ph.D. in Information Systems from the University of Zagreb. Previously he had been working as system analyst, project manager and CIO deputy (Agrokor d.d., Ledo d.d.) and from year 2000. he is permanently employed at Faculty of Economics and Business. He had published 10 books and more than 150 papers in scientific journals, books and conference proceedings mainly in area of e-business, IT governance, IT risk management, IS strategy, IS security, IS control and audit and IT Value. He is also a visiting professor at various postgraduate studies (University of Zagreb, University of Sarajevo, University of Ljubljana) with courses IT Governance, e-Business, Information Systems Strategy and Information System Control and Audit.

Mario is an associate editor and a member of Boards and Committees for a number of journals (Editorial Review Board Member of the International Journal on IT/Business Alignment and Governance - IJITBAG, International Journal of E-Business Research - IJEER, Journal of Information, Information Technology, and Organizations - JIITO, MASAUM Journal of Computing –MJC, International Journal of Computer, Information, System Sciences and Engineering – IJCISSE) and program committee member and/or reviewer for various international conferences (ICETE, IADIS, WSEAS, ICE-B, SECURE, IARIA, Bled e-Commerce Conference, MCIS, IBIMA, etc., full list at [www.efzg.hr/mspremic](http://www.efzg.hr/mspremic)).

Mario is an ISACA member (Information System Audit and Control Association), ISACA Academic Advocate, vice-president of ISACA CC (Croatian Chapter), IIA (Institute of Internal Auditors) member and member of the Centre for Business Information, Organisation and Process Management at Westminster Business School, University of Westminster, UK. Mario holds prestigious ISACA's CGEIT international certificate (Certificate in Governance of Enterprise IT - [www.isaca.org/certification](http://www.isaca.org/certification)).

Mario has also been acting as a consultant in international projects for a number of Croatian and Slovenian companies (Src.si, Nova Kreditna Banka Maribor) and in Bosnia and Herzegovina (co-director of master study program at Faculty of Economics Sarajevo and consultant for Federal Banking Agency in implementing regulatory framework for IT Governance, IS Auditing and Security and IT Outsourcing) for preferably in areas of IS strategy, IT governance and risk compliance, business process change and IS control and IS audit with the experience in implementing various IT projects and conducting wide range of information system audit projects. As a qualified information system auditor and consultant he has been participating in a number of regulatory-based IS audits and advisory projects and besides scientific, gain in-depth expert knowledge of commonly used standards such as CobiT, ISO 27001, Risk IT, Val IT, Basel II, SoX, ITIL, etc (full reference listing is beneath).

## Plenary Lecture 2

### Software Quality & Testing Metrics



**Assistant Professor Ljubomir Lazic**

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**Abstract:** Software Quality Assurance (SQA) without measures is like a jet with no fuel. Development of high quality software is very complicated and unreliable task, but the management of software development and testing process (SDP-STP) is much harder without appropriate software quality metrics and measurement establishment that assure process testing quantitative management in order to increase efficiency of software bugs detection and removal. Process improvement enables the same amount of software to be built in less time with less effort and fewer defects. Progress control tracks defects found during development in order to avoid premature delivery and to ensure the reliability goals are achieved. In-progress control and reporting of development progress gives continuous visibility to both developers and purchasers. Time to market pressure in many high technology domains' means that developers and purchasers alike require at all times to be confident the software delivery date, the expected cost and reliability will be achieved as planned. Using the core measurement data provides visibility and control each month throughout development. The data provides a full history when the project completes. This history is invaluable to understand how the project performed and to add to a growing database of development performance. We established SQA metrics repository for: Benchmarking and Process Improvement, Estimating and Risk Assessment and Progress Control and Reporting. The SQA function validates the major management areas by auditing the core measures, their use by the management processes and making sure the processes are followed. SQA is only practical in the three key management processes described here by using measures. Hence it is vital these management processes operate using quantified data. The core measurement data enables all the SQA objectives to be met in these processes. Each process directly impacts the final software product quality.

**Brief Biography of the Speaker:** Ljubomir Lazic graduated from the University Electrical Engineering School, Serbia in 1979. In the 1980s he worked as Embedded Software and Hardware Test Engineer, Test Manager and Senior Researcher at Military Technical Testing Center (MTTC). He was a member of MTTC's Scientific Council, Belgrade, Former Yugoslavia and ICT Military Expert at Yugoslav Army Headquarters. Also in the 1990s, he has been working for a local telecommunications SIEMENS Company in Belgrade as Chief Engineer in Sales & Marketing Division, Installation & Commissioning Manager and Maintenance Manager. He continued to serve industry in a variety of roles, including consulting, executive education, and expert testimony. He is docent in Computer Science at the State University of Novi Pazar, Serbia (2007- current), and docent in Software Engineering, University Union of Belgrade (2006-2010). His research interests are in Software Engineering, Software Project Management, Software Testing, Human Computer Interaction, and Component Based Engineering. Current research interests, doing as a Project leader, in two projects supported in part by the Ministry of Science and Technological Development of the Republic of Serbia under Grant No. TR-1318 (2008-2011) and TR-35026 (2011-2014) are: Optimal software project management, Software Metrics, Effort Estimation Modeling etc. He is author of about 90 papers published in international journals and conference proceedings, invited speaker (Keynote speaker at QA&TEST 2010, 9th International Conference on Software QA and Testing on Embedded Systems, 27-28-29 October - Bilbao, Spain, 2010 and PLENARY SPEAKER at WSEAS, the 6th EUROPEAN COMPUTING CONFERENCE (ECC '12) Prague, Czech Republic, September 24-26, 2012).

### Plenary Lecture 3

#### **In Silico Analysis of the Slow Delayed Rectifier K<sup>+</sup> Current (IKs) in the Heart**



**Professor Péter P. Nánási**

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**Abstract:** Since the role of IKs in ventricular repolarization is still a matter of long dispute, the performance of IKs during the plateau of a ventricular action potential was simulated. We compared the profile of the predicted current using three different mathematical models in order to determine the relative contribution of IKs to ventricular repolarization. The role of three independent variables: (1) pacing cycle length, (2) action potential duration, and (3) plateau height were simulated in three distinct layers of the ventricle: in (1) epicardiac, (2) midmyocardiac and (3) endocardiac cells of the canine myocardium. Results of these simulations were compared with experimental results obtained using voltage clamp measurements. It was concluded that the height of the action potential plateau is the most important determinant of the magnitude of IKs activated in mammalian myocardium. Accordingly, interspecies and regional differences observed in the efficacy of IKs blockers can be explained by the known differences in action potential morphology.

**Brief Biography of the Speaker:** Péter P. Nánási was born in 1956, at Debrecen, Hungary. He graduated from the University Medical School of Debrecen with an M.D. degree in 1980. He obtained his Ph.D. degree in 1992, and he received the D.Sc. degree from the Medical Branch of the Hungarian Academy of Sciences in 1999. From 1980, he has been working at the Department of Physiology, University of Debrecen - as a full professor since 2002. At the same time, he is the chairman of the "Department of Oral Physiology and Pharmacology" at the Faculty of Dentistry since 2001. During his career, he has spent 2 years in the United States, at the Children's Hospital Medical Center and at the Department of Pharmacology and Cell Biophysics, University of Cincinnati, Ohio with professors David A. Lathrop and Shirley H. Bryant. His research interest covers the physiology and pharmacology of cardiac ion channels, including the frequency-dependent interactions, regulation of action potential duration, and cellular mechanisms of antiarrhythmic and proarrhythmic actions. He is member of the Physiological Society, British Pharmacological Society, European Working Group on Cardiac Cellular Electrophysiology, MyoNaK, and the International Academy of Cardiovascular Sciences. He has published 119 full length papers (IF=310) and 6 book chapters in English language. He was also involved in more than 160 lectures and posters in the field of cellular cardiac electrophysiology.

## Plenary Lecture 4

### An Integrated Method for Short-Term Prediction of Road Traffic Conditions for Intelligent Transportation Systems Applications



**Associate Professor Gaetano Fusco**

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**Abstract:** Intelligent Transportation Systems (ITS) integrate ICT technologies with transportation engineering in order to enhance the knowledge of users and operators on the transportation system state and, possibly, enable them reacting promptly to changes of external conditions and keep the system close to a desired state.

Reliable and fast methods for estimating the current state of traffic and predict short-term future conditions are crucial for effective ITS.

Road traffic is affected by usual random fluctuations as well as by unexpected perturbations like accidents, unexpected temporary capacity reductions or demand increases. Usual performance fluctuations can be predicted quickly and effectively by mathematical functions that do not model traffic explicitly, such as time series analysis, filtering techniques and time dependent Artificial Neural Networks. However, prediction of traffic conditions in case of anomalies needs explicit traffic models.

An integrated method will be presented for short-term traffic prediction that integrates an Artificial Neural Network predictor that forecasts future states in standard conditions, an anomaly detection module that exploits floating car data to individuate possible occurrences of anomalous traffic conditions, and a macroscopic traffic model that predicts speeds and queue progressions in case of anomalies.

Results of offline applications on a primary Italian motorway will be presented.

**Brief Biography of the Speaker:** Gaetano Fusco is Associate Professor of Transportation at the Faculty of Engineering of Sapienza University of Roma and scientific expert of the Italian Ministry of University and Research.

His research interests, although they cover many aspects of the transport system engineering, are mainly addressed to study advanced methods for transport system management (usually denoted as "Intelligent Transportation Systems") and specifically focused to traveler information systems, road traffic control and network design of logistic systems.

## Plenary Lecture 5

### Scientometrics and Evaluation of Humanities and Social Sciences



**Dr. Dilda Pečarić**

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**Abstract:** The more intense and stricter demands of scientific policy is that scientific production in the Humanities and Social Sciences be evaluated with bibliometric methods and indicators (by impact factor, publishing in most cited journals, citations and visibility in „prestigious“ data bases, etc.). Theoreticians and advocates of bibliometric and scientometric methods are very skeptical regarding the application of these indicators in Humanities and Social Sciences. The fact that WOS database does not have or does the ranking list of journals in the Humanities and Social Sciences, can be read as a warning on the shortcomings of this approach. Obvious reason for lack of the ranking list of journals (impact factor of the journals) by WOS database can be found in the nature of the Humanities and Social Sciences, which do not have only scientific function. Papers are published on national languages and are not primarily intended for scientific communication but for much larger audience. That means that papers, essays and books in Humanities and Social Sciences have also cultural, educational, social and political purposes.

In spite of actual philosophy of globalization and theory that science is (or must be) international - it is a fact that Humanities and Social Sciences are primarily oriented to the research and promotion of cultural and national identity. Their subjects binds them to the national domain, although this does not exclude a multinational research, international comparisons and exchange of experiences.

Our stand is that papers in Humanities and Social Sciences cannot be measured by strict standards of scientific communication taken from the natural, medical and engineering sciences (in terms of communication forms). Because the data do suggest that this approach eliminates as non-scientific work 2/3 of production of workers in the Humanities and Social Sciences. It is obvious that cultural, educational, political and pedagogical functions are an integral part of the social and scientific responsibility of the author in the Humanities and Social Sciences. Therefore, their activity can be measured rather by influence factor and not by impact factor on which literal application of scientometric's methods insists.

**Brief Biography of the Speaker:** Đ. Pečarić graduated Information Technology at Flinders University in Adelaide, Australia, in 2004. This author received her doctorate degree in 2010 in the field of Information Science at University of Zagreb, in Zagreb, Croatia. From 2006 she works as lecture at the Department of Information and Communication Sciences, at the Faculty of Humanities and Social Sciences at University of Zagreb, Zagreb, Croatia. Authors field of interest is Bibliometric, Graphical presentation of data, Teaching Methods and Education.



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