

The VIPSI-2009 Conferences

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Veljko Milutinović, Fellow of the IEEE, University of Belgrade, Serbia

Organizer:

IPSI Belgrade, Serbia (www.internetconferences.net)

Message from the Chairman:

The field of e-government, e-business, e-education, and e-science in general is fast growing, and up to now it has been noticed that there is a large body of unpublished knowledge that needs an appropriate forum for its presentation. This was the main rationale behind the idea to organize the VIPSI international conference series. All VIPSI conferences are organized in accordance with the latest recommendations of the world's major research sponsoring agencies related to Multidisciplinary, Interdisciplinary, and Transdisciplinary research. A sign of appreciation goes also to all the people who worked hard for making this conference a success.

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About the Reviewing Process:

1. Each paper is sent to 3 internal reviewers (researchers paid by the conference to do quick and good quality performance estimation, closely controlled by the conference management).
2. Additionally, all papers are sent to external reviewers as follows:
 - a. VIPSI review:
Each paper is sent for review to four past VIPSI attendees.
 - b. Peer review:
Each paper is sent for review to four authors of other papers submitted for the same conference.
 - c. Google review:
Each paper is sent for review to four authors of the papers referenced in the paper under review, and to four people whose area of research is similar to the subject matter of the paper submitted for the VIPSI conference (email addresses or these 8 authors are found via Google).
3. It is also expected that each author consults his/her colleagues locally, and asks them to help improve the paper.
4. Finally, each paper (before being published onto the conference CD) is inspected by the Conference Chair – Professor Veljko Milutinović, Fellow of the IEEE.

Our treatment of each submitted paper is based on minimum four external reviews.

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Academic Mind

The IPSI Research Methodology in Infrastructure for E-Business on the Internet

Veljko Milutinovic

This presentation defines the major bottlenecks in the research related to the infrastructure for e-business on the Internet (hardware, software, system, and communications), and follows in two parts, with the stress on methodological issues. In part one, for each one of the major 4 bottlenecks, an overview is given about the ongoing research at Stanford, MIT, and UC Berkeley. In part two, for the same 4 bottlenecks, an overview is given about the recent (past 5 years) and ongoing research done at the University of Belgrade (led by Professor Milutinovic), for industry in the USA, and for selected universities in EU. Results of this research include prototypes for a number of commercial products and about 40 papers published recently in IEEE journals. Topics covered by the research and this presentation include: On-chip and on-board accelerators for PC software, microprocessor improvements for modern e-business, efficient integration of computing and communications, genetic Internet search, customer satisfaction based Internet search, medical issues on the Internet, engines for e-ducation, e-tourism, technology transfer, and scientific interchange on the Internet, semantic web analysis, etc.

Tutorial on Datamining for E-Business on the Internet

Nemanja Jovanovic, Valentina Milenkovic, and Veljko Milutinovic

This tutorial covers the field of datamining in general, talks about its possible applications (special case studies can be added on request), and elaborates on the issue of hardware accelerators for datamining. The introduction gives a formal and an informal definition (through an example), plus it points to possible misunderstandings typical of the topic. The part on methods and algorithms covers a number of different approaches, each one presented through animation, using the examples that are both colorful and unusual, but excellent for pointing into the essence. The part on tools lists about a dozen different tools, and selects one for a detailed case study.

Tutorial on Semantic Web

Veljko Milutinovic, University of Belgrade

Semantic Web is a concept that enables better machine processing of information on the Web, by structuring documents written for the Web in such a way that they become understandable by machines. This tutorial explains all above, using both the basic theory and the appropriate examples. Semantic modeling languages like the Resource Description Framework (RDF) and topic maps employ XML syntax to achieve this objective. New tools exploit cross domain vocabularies to automatically extract and relate the meta information in a new context. Web Ontology languages like DAML+OIL extend RDF with richer modeling primitives and provide a technological basis to enable the Semantic Web.

Concept Modelling for Knowledge Search

S. Omerovic, S. Tomazic, V. Milutinovic

People use concepts every day to express their thoughts. Concepts are used in human communication because they carry unique meaning (for example: a house, a dog, a car, etc). Still, one does not know how the derivation of concepts from learned knowledge and everyday perception is done. For every person, concept derivation is unique. Consequently, there is no unique definition of the term concept, and there is no commonly accepted understanding of what a concept is. In general, every object, issue, idea, person, process, place, etc. can be represented by a concept. This presentation is a survey of ongoing research efforts in concept modelling.

Nobel Laureate Presentations at VIPSI Conferences

Mastering the e-Science

Herbert Simon, Nobel Laureate, United States of America

Our generation like all its predecessors leaves many tasks – hopefully no more than it inherited – for the next generation to take up; but even knowing that it must be so does not remove one's sense of loss in the parting.

Computer Architecture: Concepts and Systems

Kenneth Wilson, Nobel Laureate, United States of America

The coming of the computer has created a revolution as profound as the change from the Middle Age to the Renaissance. Many of the changes that took place around the time of the Renaissance – the invention of printing the development of systematic experimental science, the invention of oil painting – have analogs today, made possible by the computer.

TV is dead – Long Live the WEB (SSGRR-2000)

Harold Kroto, Nobel Laureate, University of Sussex, United Kingdom

Science, Engineering and Technology (SET) are as vital to our intellectual and cultural development (particularly our children's) as they are to our training to get along in the Modern World. Some efforts to redress the problems involved in the general Public awareness and understanding of science and engineering issues are being initiated via the Vega Science Trust. The best scientists and science communicators are being recorded and the programmes are being broadcast on BBC-TV and the Internet. These efforts present a perspective on SET which places the cultural factors in the foreground and focuses on the intrinsic charisma of science which is hidden from many.

Electronic Business and Education (SSGRR-2001)

Bob Richardson, Nobel Laureate, Cornell University, United States of America

There is no longer any question that the Internet and electronic communication are the major new tools for collaborative advances in the creation of new knowledge and in future learning. Similarly, international and multidisciplinary collaborations in scientific research based upon little contact other than through electronic communication dominate the scientific literature. A significant challenge to devise a remote mode for nonverbal communication about difficult concepts remains. In the shared creation of new ideas and knowledge, facial expressions and body gestures frequently play an important role in peer interactions. As the speed and bandwidth of electronic communication increase, we have the prospect that the important elements of human contact can be imitated.

E-Business and E-Challenges (SSGRR-2002)

Jerome Friedman, Nobel Laureate, MIT, United States of America

The development of Homo sapiens has been a history of innovations, from the earliest crude tools to the modern technological society of today. It is ironic that quantum mechanics, one of most abstruse conceptual frameworks in physics - one that was developed to explain atomic spectra and the structure of the atom, lies at the foundation of some of our most important technological developments, because it provided the understanding of semiconductors that was essential for the invention of the transistor. The Internet and the World Wide Web, which are profoundly reshaping the way that we communicate, learn, and engage in commerce, owe their origins in a deep sense to the physicists of the past who worked to understand the atom. In modern industrial nations, quantum mechanics probably lies at the basis of a sizable fraction of the gross national product.

Nobel Laureate Presentations at VIPSI Conferences

Neural Networks: Concepts, Applications, and Implementations (2003)

Leon Cooper, Nobel Laureate, United States of America

When interest in neural networks revived some fifteen years ago, few people believed that such systems would ever be of any use. Computers worked too well; it was felt that they could be programmed to perform any desired task.

Number and Organization of Primary Memory Objects in the Brain (IPSI-2004 Montenegro)

P.G. de Gennes, Nobel Laureate, College de France, France

A memory area contains a large number ($N \sim 10$) of neurons, each of which is connected with many neighbors (number of efferents: $Z \sim 10^4$). But the connections are poor: the probability for one connection to be efficient is $p \sim 10^{-2}$. This is important: different memory objects must be independent. We discuss how a definite memory object can be stored on a cluster of well connected neurons, and what the statistics of these clusters is. The average number M of neurons per cluster is contained within two limits: if M is too small, the memory is not faithful. If M is too large, the storage capacity is too small. Various consequences of this picture will be presented.

About Creativity (IPSI-2007 Japan)

Martin Perl, Nobel Laureate, Stanford, Palo Alto, California, USA

This presentation summarises the experiences related to team development, topic development and project management. It is based on the decade's long experiences of working with young scientists.

The Next Generation of IP – Flow Routing

Lawrence G. Roberts, Father of the Internet, United States of America

For the last 33 years IP routers have not changed, they still support only “best effort” traffic. However, the bandwidth available to people has been increasing rapidly with the advent of broadband access. The result is that many new services are now desired that require far better QoS than “best effort” IP can support. All these problems can be solved with no change to TCP/IP by routing flows rather than packets. This requires keeping some state information for the duration of the flow, but this information can be captured on the fly as the first packet goes by. This permits an IP flow router to achieve all the capabilities of an ATM switch, but without the call setup delay and at a lower cost than a conventional IP router.

Review support:

Shuichi Ichikawa, Ana Justel, Raymond D. Horton, Ram Jakhu, Victor C Xiong, Richard Yalch, John Sutherland, Judith Engelbrecht, Florence Margai, Allen W. Heinemann, Nancy A. Baker, Joan C. Rogers, Arnold Schecter, Irina Cech, Trent Rosenbloom, Du-Babcock Bertha, Akhilesh Bajaj, A. Goldberg, Ismat Bhuiya, Richard Sylla, Rolland LeBrasseur, Massimiliano De Santis, Jindrich Kaluza, Biren Shah, Vaclav Snasel, Paul E. McKenney, Barbara Starfield, Kent Beck, Tony Bates, Charles Perrings, Aat Barendregt, Stephen Brewster, Chris Johnson, Steve Boot- Butterfield, Leila T., Chun Mark, Andrea Goldstein, Hulya Ulku, Jane Dimmitt Champion, Mary Dunn, Dennis Peters, Asghar Bokhari, Qing Xie, Tomas Brandejsky, Bernhard Westfechtel, Jaap de Wilde, Kyle Grayson, Gunhild H., Jack A. Goldstone, Walker Stuart, Albert F. Puttlitz, Dennis R. Olsen, Chin C. Lee, Mary Grant, Dan Dewey, Jerry Grossman, Tamas Vicsek, Michael L. Littman, John Tsitsiklis, Christine Fernandez, Sebastiano Porretta, Michael Kaib, Martin Luerssen, David Powers, George Bekey, Doina Caragea.

The dynamics of Knowledge Spillover for functionality development in Japanese Acoustic Equipment Industry

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The purpose of this study is to demonstrate how Knowledge Spillover affects functionality development by an analysis of trends in number of patent applications as proxy of technologies. We classified acoustic equipment technologies in Japan using International Patent Classification (IPC). We classified Transducers as a basic technology, and Components, Circuits and Diaphragms as complementary technologies. The results show that the trend in number of patent applications of complementary technologies related with each other, and their trend followed the trend in number of patent applications of a basic technology. It is assumed that Knowledge Spillover from a basic technology to complementary technologies affected the functionality development of acoustic equipment.

Distributed Sensor Network for Vehicle Detection

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A prototype sensor network is described containing Pyroelectric (Pyro) and Anisotropic Magnetoresistive (AMR) sensor modules that are able to detect vehicles motion and displacement along a monitored road. The distributed wireless or wired sensor network is composed of sensing modules deployed along the roadside, the slaves, and a gateway module, the master. The characteristics of the sensors are studied, the detectors characterization is carried out and the performance and cost of the signal-processing and vehicle detection algorithm are discussed. The sensor system has been used to detect up to two vehicles in different road lanes.

Keywords: vehicle detection, pyroelectric sensor, AMR sensor, wireless sensor network, wired sensor network.

New Challenges in Teaching Mathematics

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20 years ago the computer algebra system Mathematica was developed by Wolfram Research in the United States. For the first time symbolic mathematics was easy to handle on a computer. Together with the development of markup languages for the Internet this has given us the possibility to develop high-quality digital content for eLearning in mathematics. Many European projects into mathematical eLearning have had especially one main goal: To prevent the number of students in mathematical courses and the number passing the examination reaching a critical low level. To meet this challenge the pedagogics and methods of communicating mathematics will have to undergo an innovative process where new technology is important. However this has turned out to be harder than expected, the main reason being that it requires expertise in several subject matters as well as expertise in several technologies. In the case of mathematics, the required areas of expertise include that of professional mathematicians, software engineers, publishers, and perhaps learning theorists. This article presents an overview of the most important European projects into online learning in mathematics in the context of the Bologna Declaration concerning the tailoring of the structure of the European Higher Education Area (EHEA).

Shifting from Database to Ontologies: Tools, methods and benefits of the software reasoning

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The amount of Information available to any organization has since a long created the problem of managing the amount of effective knowledge stored in data. One efficient solution is the Semantic Web. Yet the knowledge stays in Databases and the adoption of the Semantic Technologies can present difficulties for any organization. With a proper set of software instruments, it is possible to quickly envision the potential, the efforts and benefits of shifting toward the Semantic Web, using standards such as the Description Logics language that can be used in software reasoners for making inferences on semantic meanings.

Keywords: semantic web, description logics, software reasoners

Information content of process signals in quality control

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Role of quality control in industry, software engineering and government. Control schemes: measurement and actuator signals. Process time constants: material balance control, production control, quality control. The concept of quality assurance and quality culture. Control system as a simple teleonomic, purposeful, system. Kolmogorov definition of teleonomic entropy. Realization restrictions in Kolmogorov entropy calculation. Shannon entropy as system uncertainty measure. Carnap entropy measure by calculating Voronoi diagram of respective signal. Introducing one-dimensional Carnap entropy measure of quantitative signals. Pragmatic question in calculating Shannon entropy: lack of data in some data classes. Problems of Carnap 2D entropy: multiple data points, split-down of signal space, data resolution and calculation duration, interpretation of obtained results. Pragmatic questions in calculating one-dimensional Carnap entropy of control signals: equivalency of entropy measures for slightly different signal shapes, cases of short decision intervals. Calculation of measurement and actuator signal entropies of a two-stage laboratory heat exchanger. Entropy contents of quality control signals in highly automated ceramic tile plant.

Key words: signal entropy, process control, one-dimensional Carnap entropy, tile production quality.

On concurrence of Decision Making Processes

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The question of concurrence of decision making processes in complex situations focuses more and more the deep attention of researches and practitioners. Cases have special meaning, in which responsible decisions have been undertaken by people being under influence of stress. The problem is the quality of decision which has been made. A model of such situation as well as the related algorithm of decision process is worked-out by the author on base of results produced by the computer simulations. The constructive solution of the problem is achieved. The quality of admissible solution is estimated.

Keywords: decision making, stress, DiffCon theory, two-factors utility theory, concurrence of processes

Examination of hardware RAID solutions under Linux: RAID-0 v RAID-1

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This paper represents an assessment (evaluation) of hardware RAID solutions under the Linux Operating System. Paper includes a performance comparison of two popular RAID levels such as RAID-0 and RAID-1, including a level RAID-1+0 under Linux kernel version 2.6. The performance is measured using 3 different benchmark software applications: Postmark, Dbench and Tiobench.

Keywords: RAID, SAS, Linux, filesystem, performance evaluation

Interactive System for Navigation, Visualization, and Retrieval of Video and Image Data

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Prospects of AI in Scientific Theory Creation

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This article addresses the plausibility of more complex research, the discovery of new AI-based methods, as well as knowledge discovery in data, which would help create new scientific theories. Many of today's scientific fields contain competing theories, and their differences are interpreted as partial establishment of knowledge during limited-scope research containing a limited number of cases, as well as predictor and dependable variables. This results in many theories overlapping, and mutually supplementing in a large number of cases. Presented here is the opportunity to revise, unify, and integrate such competing theories. Through the application of various AI-techniques, it would be possible to attain key simplification of textual descriptions of those theories into a conceptual graph. This would serve as a basis of research designed to measure all the key variables from competing theories. The obtained data is then subjected to analysis, focusing on the correlation between the variables. An optimized aggregate overview dependencies between variables and theories is made. In this last case, neural network and genetic algorithm techniques, often conducted as meta-analyses, are applied along with classical statistical techniques (correlation). The procedures are formalized in a newly proposed method that contains the following steps: 1) identification of competing theories, 2) text-mining of descriptions of existing theories and creation of a conceptual graph of their interdependency, 3) creation of research of the same sample that encompasses concurrent verification of all the theories, 4) analysis of similarity between theories, 5) compression of all theories into a new theories and the attainment of their textual description. The method was demonstrated in the creation of an integrated theory on learning styles, and the potential to apply it in a series of other scientific fields where competing theories exist is apparent.

Keywords: Data mining, Theory creation, Scientific discovery

Achieving a Comprehensive and Integrated Energy System through Electricity

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A significant achievement of, and threat to, modern society is abandon with which energy is used for vehicles, electricity, and space heating/cooling. The very scale of these activities is changing the atmosphere, the landscape and even the way we think. Yet energy developments have traditionally been piecemeal within electrical, transportation and space heating/cooling sectors. With illustrations from Ontario, this paper seeks to integrate the electrical system in the context of transportation and heating/cooling demands, thus allowing electricity to facilitate a move to cleaner and greener sources. In this new context, the collective benefits of energy optimization, efficiency and storage become even more crucial.

Keywords: Battery, Canada, Cooling, Electricity, Energy, Environment, Fuel, Heating, Infrastructure, Ontario, Policy, Provinces, Public, Storage, Society, Transportation, Vehicle, World

Conceptual Design Flaws in Software

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The quality of a design has a decisive impact on the quality of a software product. Current approaches in automatic detection of design flaws are primarily based on analysis made on the structural decomposition of the system which derives from the structure of the code itself. Programming is modeling the reality, but object oriented modeling causes a deflection from the domain model (which reflects reality), due to programming languages constraints. On the other hand, an ontology gives us a conceptual decomposition of the domain model. Comparing the structural decomposition of the system and the conceptual decomposition of the domain model enables a new dimension for the design problems, one where the design doesn't follow naturally the problem domain. Using existing knowledge for identifying concepts and relations between them in the source code, in our work we investigate the design flaws in this new dimension and we validate our results on a well known case study. We also look for a correlation between the problems that appear at the structural and conceptual level.

Sectorial Analysis of Mexican Software Industry: An empirical research of the relationship between technological innovation, market orientation and business performance

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The objective of this study is to analyze the relationship between technological innovation and market orientation, and their influence on companies' business performance, in a high technology sector: the Mexican Software Industry. This study is analyzed under a positivistic and deductive approach, using multivariate statistical analysis on the data gathered via an online survey from 198 software industry companies. The results suggest that these three factors are related in a different way that they do in other industries.

Keywords: Market orientation; Technological innovation; Software industry.

The Pentalogy

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Attending seminars, Conferences, looking at "television lessons" the author saw many times many people (often Professors) that did not know the matter they were talking about; nevertheless they write papers, suggest books to students, provide lessons, make consultancy. Visiting Companies the author saw many times many Companies lacking Quality of Management, a huge problem against Quality achievement. Many people (often Professors) think that Quality in written documents is assured by the "Peer Review Process" carried out by members of "international scientific community", and that "Quality of teaching" is assured by their "academic standing...". To be real Managers, Present students and Company Management need to grow-up their knowledge because experience alone, without theory, teaches nothing what to do to make Quality. For Higher Education Institutions, this means that professors MUST learn Quality ideas on Quality Management, in a correct and scientific way. All the methods, devised by F. Galetto, have been used for preventing and solving real problems in the Companies he was working for. In the paper, one of the five of the "pentalogy", as already done several times, we present some cases (out of the hundreds known to the author) where professors (and referees, as well) were acting with disquality. Would that be useful? Only God knows that...

Keywords: Quality Education, Peer Review, Quality Magazines, Quality Methods, Rational Manager, Scientific Approach, Quality Tetralogy, Intellectual Honesty, Fuzzy Theory, Control Charts, DOE, Optimisation, Quality Prevention, Quality Improvement

The Dumbing Down Effect of American Public Education

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The year 2008 marks the 25th anniversary of the appearance of an important document, A Nation At Risk, which castigated the American public education. All subsequent educational reforms resulted in either modest improvement or further deterioration. This author traces the major reasons of failure to excessive emphasis on domain-specific knowledge and logical deductions. As a consequence, students were overwhelmed with a large amount of knowledge to be memorized. Their grade performance was achieved at the expense of critical thinking. An indirect reason was the failure of the mainstream psychologists in elucidating factors behind the apparent differences between creative individuals and their less privileged counterparts. In our quest to demystifying the enigma of human's high creativity, we have identified visual thinking as the major missing link in educational reforms. Visual thinking was also the hidden factor in deciding the success or failure of a number of popular educational approaches, which include small group teaching, cooperative learning and constructivism, and a popular corporate technique called brainstorming.

Working place comfort - a small WSN proposal

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Lisbon Strategy 2000 in Higher Education of Europe

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The conclusions of the European Council (Lisbon, March 2000) are well-known. They state the following: "Europe should become, by 2010, the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion". This paper gives an overview of the present situation in Higher Education in Europe. The publication of the "Institute of Higher Education, Shanghai Jiao Tong University" - Academic Ranking of World Universities 2008 and Ranking Web of world universities (Spain) are analyzed. The paper gives an analysis of the scientific journal publications in 2007 from professors/researchers from the USA and Europe.

The Next Generation of Microprocessors

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Computer processing has reached a crossroads where the relationship between hardware and software must change to support the increased processing needs of modern computing workloads, including virtualized environments and media-rich applications. Accelerated computing uses specialized hardware to increase the speed of certain processing tasks, offering commercial and consumer users simultaneous energy efficiency, high performance, and low cost. From a hardware perspective, accelerated computing provides a general platform that supports the addition of specialized processing units, or accelerators, to a multi-core computer. These accelerators may take the form of off-core chips such as media or network packet accelerators, or they may be additional integrated cores designed for specific types of processing tasks. From a software perspective, the accelerated computing framework will simplify writing parallel applications: developers will have high-level tools that support parallel programming, and applications will not have to specify which hardware should be used for a given processing task.

Keywords: Computer architecture, Very-large-scale integration, Power demand, Parallel processing

Innovation in Adaptive Educational Hypermedia Systems

Ioana Ghergulescu, Sabine Moebs, Cristina Hava Muntean

Adaptive Educational Hypermedia Systems (AEHS) represent an alternative to the traditional e-learning environments where the same content is delivered to each learner. These systems personalise and adapt the educational content and other aspects of the e-learning environment in order to match learner's knowledge, goals, preferences, skills, etc and to improve the Quality of Experience (QoE). The research presented in this paper combines considerations of social connectedness with motivation and Adaptive Educational Hypermedia. For bringing together social connectedness and adaptivity we introduce a social interaction component to the architecture of the AEHS. The component enables awareness of online presence of learners working outside the learning system and continuous social interaction. It connects learning and online presence. Learners use tools of their choice that they are already familiar with.

Keywords: Adaptive Educational Hypermedia System, E-learning, Social connectedness, Motivation

VANET: Vehicular Ad Hoc Network

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Symbiotic Networks: An Emerging Export Opportunity for the New Zealand Wine Industry

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This paper discusses opportunities and threats facing wine producers with regards to international networks and relationships. Using the case of a successful winery, the prospect of internationalisation through networking is outlined. Attention is given to Montana's strategic alliance that was formed in order to break into the US market. The study shows the significant time, effort and monetary commitments that are necessary in order to find an appropriate partner in a network and how a successful relationship can provide numerous benefits. The paper discusses the key elements of successful relationships and thereby offers suggestions regarding the use of co-operative networks.

Keywords: Symbiotic Networks, Export, New Zealand, Wine Industry, Montana, US wine market

The Serbian Data in the Multilingual Cities Project, Gothenburg, Sweden.

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In 2001/2002, as part of an EU project called the Multilingual Cities Project, pupils aged 6 to 12 in 80% of all Gothenburg schools participated in a survey of their self-reported language use, language skills, and birth countries of the family members. One language group in the data is the Serbian-speaking children in Gothenburg schools, and in this presentation I will share the data specifically reported by these pupils and relate them to the over-all data gathered in the survey pertaining to pupils who use other languages than or in addition to Swedish in their homes.

Keywords: Multilingual Cities Project, Serbian language, School children, Gothenburg (Sweden), Language use, Language vitality

Personal Networks: MAGNET and Beyond

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The MAGNET Beyond is a FP6 IP project that introduces the concept of Personal Networks on a global scene. Its overall objective is to design, develop, demonstrate and validate the concept of a flexible Personal Network (PN) that supports resource-efficient, robust, ubiquitous personal services in a secure, heterogeneous networking environment for mobile users. This presentation gives an overview of the concept of Personal Networks and PN-Federations, explains the conceptual architecture defined in the MAGNET Beyond project and highlights the major project achievements (user centric design, multimode high data rate / low data rate operation; overlaying middleware structure, security concept, etc.). PN and PN-F concepts and solutions offered in MAGNET Beyond pave a way towards personalisation and the Fourth Generation (4G) of wireless systems which will integrate different wireless technologies and will provide broadband connectivity to variety of wireless devices.

Keywords: Personal Networks, MAGNET Beyond, PN-Federation

Nonlinear Vibrations and Deterministic Chaos

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The nonlinear vibrations and the deterministic chaos, which are the phenomena widely spread and present in all fields of science and engineering as well as in everyday life of human beings, are discussed. Besides the well known phenomena (such as resonance, synchronization and fluttering), the effects of bifurcation, self-excited vibrations, amplitude jump and dependence on the initial conditions are considered. The deterministic chaos, which represents the steady state motion of a real system dependent on the initial conditions, is specially treated. Various types of strange attractors that illustrate this type of motion are shown. The possibility of controlling chaos and its transformation into periodical motion is considered. The special attention is given to the issue whether it is possible or not to make accurate long-term prediction about the behavior of the system due to its strong sensitive dependence on the initial conditions. The theory of nonlinear vibrations and chaos is applicable to the systems in mechanical engineering, acoustics, civil engineering, electrical engineering, biology, chemistry, medicine and even to the problems of the theory of population.

Impact of the Globalization Phenomena on Higher Education

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The information society that we are all witnessing is imbued with new relationships between higher education and the society as a whole. Analysts of these relationships increasingly intensify the development of the 'academic capitalism' theory that serves to explain the process of integration of universities and colleges into the new economy. The development and management of a system as complex as an integrated information system of universities, needs to be based on SP-IBIS strategy, which is the link between academic and information system strategies, as well as the business strategy. Its application presupposes the transformation of business doing in accordance with the demands of Bologna Declaration, such as lump sum financing method, requirements for high quality and timely information on competition, potential markets, potential financing sources, technology, as well as economic and political trends at disposal – discussed in more detail in the paper.

Keywords: academic capitalism, integrated information system of universities, technology

Advanced eGovernment Research

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Increased expectations of citizens that public sector organizations will provide effective and efficient services similar to those in the commercial sector have triggered many advanced research initiatives in the field of eGovernment. Mostly they focus on solutions to vertical and horizontal integration problems and related interoperability problems. They are based upon improvement of eGovernment solutions through enterprise architectures, government processes automation and technologies related to Web Services, Semantic Web and ontologies. The session will discuss main challenges that research initiatives are trying to solve. Examples of two research initiatives will be presented: first one that is focused on achieving a higher level of automation of government processes and process activities that need human participation; the second example will discuss a possible way of improving government processes with Semantic Web Technologies.

Keywords: eGovernment, Interoperability, Enterprise Architecture, Business Process Automation, Ontologies, Semantic Web

The New Approach to Diet Generation for Health - The "MacroWisdom" Project

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All around the World there are some projects on diet generation. More of them are Government based and their main goals are to optimize costs for food in large Government organizations, like army and hospitals. It is important for hospitals' generators to achieve diets, which could help to patients in healing their diseases. I have the new approach to diet generation. This is based on user's preferences, needs and environmental impacts and this system should be implemented on the Web, as "MacroWisdom" project. The idea is about an information system, which should generate macrobiotic, vegetarian or other (flexible) diet in order to user's biases, condition and constitution. One of issues on this system is an implementation of a suggestive intelligence, which advises how user could overcome cravings and what could be dangerous for him or her with current eating and living habits. This part of system should be based on inquiries, since the diet generator should be based on simplex method.

Keywords: diet generator, macrobiotics, operational research, simplex method, B2C, e-Commerce

Can the Existence of Dark Energy Be Directly Detected

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Matter, Energy, and the Universe

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Power Issues in Wireless Sensor Networks

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An ultimate form of wireless sensor networks is the autonomous system on a single die (ASOC). This is a convergence of RFID type technology with SOC silicon technology including silicon transducers, sensor controllers and battery, all on the same die. The major architectural implication is design for extremely low power (1 microwatt or less) and strict energy budget. This requires a rethinking of clocking, memory organization, and processor organization. The use of deposited thin film batteries, extremely efficient RF, digital sensors and MEMS complete the ASOC plan.

Millennium Scientific Paradigm and Climate Millennium Intervention

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Author considers importance of energy for development of civilization as well as energy as a measure of technological progress of future civilizations with Kardashev scale when exist three types of advanced civilizations. Energy reach of today's civilization is still under level of Type I because capability technological it uses just part of disposable energy on Earth; current status of human civilization is on level 0,72, of Type I civilizations. Author indicates that climate control on the Earth, which is also, energy problem of Type I civilization that during actual climate changes on the Earth becomes the most important issue of today's civilization. Author considers overcoming of existing scientific paradigm and need to sett up planetary solar program as a basis for quantum leap toward Type I civilization and proposes model climate control on the Earth called Millennium intervention i.e. building orbital lampshade. Author proposes new scientific paradigm and appeals to the planetary debate.

Keywords: energy, technologically progress, advanced civilizations, solar program, scientific paradigms

Tissue Engineering of Living Cardiac Patches

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Heart disease is a leading cause of mortality in the Western world. Due to the limited ability of cardiac muscle to regenerate and the shortage of organs available for transplantation, there is a need to create functional cardiac tissue equivalents in vitro. These lab created cardiac patches could then be used to replace scar tissue upon myocardial infraction or for treatment of congenital malformations. We engineered living cardiac patches by combining cells (cardiomyocytes) with biomaterial scaffolds and cultivating them in bioreactors designed to mimic some aspects of the in vivo environment. This presentation will focus on electrical field stimulation as a tool for cultivation of a differentiated cardiac tissue. Bioreactors with perfusion of culture medium will be discussed as means to overcome diffusional limitations in oxygen transport during cultivation. In terms of biomaterials design, we are investigating the ability of growth/survival factors covalently immobilized onto scaffolds for tissue engineering, to improve spatial uniformity and density of cells in engineered tissues.

Web Schooling Portal

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Internet technologies are having big impact on all aspects of today's life. This includes schooling methods and processes. Currently, schools are using Internet solutions to a limited extend. Mostly, students are using web browsing, emailing. Many schools have their own extranet where students can see school agenda, access important files/information or order books, learning tools & accessories. This paper explains one way of improving communication between students, students and teachers, adding many possibilities for a learning process like video-lectures, online courses, remotely consultations, improving communication with social networking etc.

Keywords: Web, Portal, School, VoIP, Messaging, Social Network

Cryptography over wireless channels

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Wireless communication systems have found heavy deployments over recent years and many popular applications for wireless networks have emerged recently including, voice calls, SMS, MMS, web browsing and video conferencing, to name a few. Communication over wireless channel, however, is inherently prone to transmission errors. In this paper the method of Joint Channel Coding and Cryptography, for error control over a unidirectional channel, has been analyzed and simulated over a wireless channel. Joint Channel Coding and Cryptography is an extension of Soft Input Decryption with feedback, which is used for improvement of channel decoding of secured messages. The benefit is two-folded, security as well as efficient error-recovery in the transmitted data. Results of simulations of Joint Channel Coding and Cryptography are compared to results of convolutional coding with the same coding rate. Our results show that, Joint Channel Coding and Cryptography brings coding gain of 0.72 dB, while fulfilling security requirements at the same time.

Computer Modeling and SUN-spot System for Physical Therapy of Low Back Pain

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Low back pain is a major health and socioeconomic problem across Europe. It is estimated that 12-30% of adults have low back pain at any time and the lifetime prevalence in industrialised countries varies between 60% and 85%. We propose the development of an intelligent patient-centric framework for the prevention of back injuries and the prevention of case worsening, by addressing the need of patients for prompt medical advice at the required time and place. A Smart Wearable SUN-spot Assistant (SWSA) is used to monitor and educate patients as well as people at risk. Customization of this system is done on a single wearable accessory for specific patient. It can be also adapted to existing health care systems. The medical doctors collect information from wearable sensors and by using knowledge discovery techniques they may predict further medical intervention. This system also contains corresponding alerts that help clinicians for immediate interventions and changes to treatment regimes. The finite element model of spine motion segment is also included in this software system. Computational modeling is done in order to optimize spine motion as well as to learn a patient for better spine moving and conditioning. User-friendly interface is developed for control each part of this complex software and hardware system.

International Network in Mechatronics Education

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As a result of the project “Mechatronics”, which had been sponsored by DAAD, the Mechatronics departments of Technical University of Ilmenau (Germany), Technical University of Sofia, University of Niš, Technical University of Budapest, University of Maribor, University of Skopje and Technical Faculty of Subotica have built international network in Mechatronics education. Within the scope of the project shared Curriculum database information system has been built. The collaborating departments has started with the realisation of common laboratory practice. Students could attend these laboratory practice through internet. It makes students’ knowledge more comparable in order to support students’ mobility required by the “Bologna initiative”.

Keywords: Mechatronics, education, laboratory practice through internet

Architecture-Agnostic Parallel Programming in Supercomputing Research
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Advances in Multimedia with Focus on Computer Vision and Art
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Contemporary art nowadays tries to exploit modern technology to better address and enlighten specific problems and ideas of our time. Our interest in wider impact of modern technology on society and the interest in contemporary art, brought our attention also to the applicative field of use of computer vision methods in art. The talk will walk us through a few projects, proving that art is definitely a perfect testbed for our research: 15 seconds of fame, Virtual skiing, Dynamic anamorphosis and Virtual painter, from face detection, motion following, depth recovery, touchless human computer interaction to pop-art, constant eye gaze of a person on the portrait, regardless of where the spectator stands, immersion into different virtual worlds without the need for any special equipment.

Keywords: Contemporary Art, Face Detection, Tracking, Depth Recovery, Transformations, Human-Computer Interaction, Virtual World, Social Impact

Human Carrying Capacities: A New Economics
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This paper explores a methodology for changing how economists view the world. In biology, the 'carrying capacity' ('K') is the maximum sustainable population where deaths catch up to births, usually due to resource depletion, competition, and disease. If the global economy was to internalize the sum of our resources, its collapse, together with recent 'ecological surprises, may well be another early warning that the world at 7 billion people has surpassed K. Criteria for a new economic model are proposed, which, applied to accumulating debt and unemployment, support the early warning hypothesis. 'Depopulate, automate, and conserve' policies are proposed to be the best approach to this threat to the quality of human life.

Keywords: Global economy, externality, overpopulation, carrying capacity ('K'), resource depletion.

New World of Discrimination
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Discrimination is very important in the real world. And it is essential for the science, too. This is approached from the statistics, pattern recognition, and mathematical programming such as SVM. I developed several discriminant models by integer programming and linear programming. These models reveal new surprised facts about discrimination. If we consider the discriminant functions that misclassify the same cases are equivalent, the coefficients of these functions are the interior points of same convex polyhedron in the coefficient space. There are optimal convex polyhedrons with minimum misclassification number (MMN). We can investigate the new world of discrimination by MMN.

Keywords: Minimum Misclassification Numbers (MMN), linear discriminant function, integer programming

Intentional Knowledge Transfer to Improve Design While Reducing Operational Expenses

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All experts face the dilemma about where to draw the line between the effort of achieving a better design and when to implement a project. Although premature implementation often leads to expensive maintenance and operational problems, seeking perfection leads to costly and delayed projects. The challenge of making such decisions in complex energy systems is further complicated by extensive overlap of technologies, by the broad design experience and knowledge requirements, and by the ever-present social and economic dimensions. The question of how to achieve the best balance between design and operation is specifically considered for several well-known hydroelectric plants, along with reflections on how this knowledge can better be transferred to less experienced designers.

Keywords: Design, Expert, Experience, Maintenance and Rehabilitation, Knowledge, Hydroelectric, Design Review

Advanced Treatment of Cold Wastewater

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This paper discusses treatment of cold wastewater, with the focus on municipal wastewater. The concept “advanced” in this paper is understood as biological nutrient removal and includes a discussion on the use of so called “bio-membranes”. The main reasons to address this subject are presented. One major concern in this context is expressed by the EU directive EEC91/271, that especially points out that nitrogen removal is not feasible at low water temperatures. A growing concern in the industrialized world is that complex compounds are disposed into sewers. This in turn calls for advanced treatment methods. Performance results are shown from a number of full-scale plants operated at low water temperatures. As a performance indicator the biological nutrient removal is used. Nitrification has been established even at very low temperatures, one example with $T = 2.5$ °C. Biological phosphorus removal has been found to take place at 4 °C. The importance of the Solids Retention Time as key factor is discussed as a way to decrease complex organic compounds. A modified way to assess the energy efficiency for treatment is suggested by using kWh/kg OCPremoved as a basis.

Keywords: Bio-membranes, water temperature, nitrogen, phosphorus, SBR, reaction rates

Understanding Creativity

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We have never seen creativity. More precisely, we have never seen the creative process; what we have seen is the creative individual (ex ante) and the outcome of creativity (ex post). Therefore we try to understand creativity by examining creative individuals and their creations; in this paper we only consider the creation of new knowledge. We draw on a wide variety of backgrounds. We wander into the area of cognitive psychology to investigate who is talented for creativity. We also draw on arts, history and philosophy of science, stories of mystics, some great novels and essays we have read and our experience in both working with creatives and creating new knowledge. Based on this shaky foundation we will describe creativity through jokes, as illumination, as a quest for harmony, as being kissed by the muse.

Future Microprocessors: What must we do differently if we are to effectively utilize Multi-core and Many-core chips?

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The microprocessor first surfaced in 1971 with 2300 transistors. Today, some microprocessors have more than a billion transistors on a single chip, and Moore's Law predicts 50 billion transistors in a very few years. This continuing exponential growth has unsurprisingly already resulted in the multi-core chip, and we will soon see the many-core chip. Yet, we do not get corresponding improvement in performance. The pseudo-gurus blame it on the "energy wall." I disagree. I believe it is because we must make some fundamental changes to what we provide in the hardware and what we expect of the software. Understanding the benefits and costs of abstraction, parallel programming, and education would be a good first step. In this talk, I hope to do three things: (1) explain how multi-core came about, and why this use of the wealth of transistors has been misguided, (2) look at what I call the Transformation Hierarchy which I believe holds the secret, and (3) suggest ways in which we must do things differently if we wish to design microprocessors that can take advantage of the enormous resources available to them.

A Wireless Sensor System for the Home Care solutions

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Computers and Education

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The history of computer science is a thriving subject, yet is not accepted as an academic discipline. How can we improve teaching of computer science by relying on knowledge in its history? This paper contributes toward making the "history of computer science" a valued component of education and research in this field.

Keywords: History of Computer Science, Computer Science Education

Concepts, Ontologies, and Knowledge Representation

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Recording knowledge in a common framework that would make it possible to seamlessly share global knowledge remains a central challenge for researchers. This annotated survey of the literature examines ideas about concepts, ontologies, and knowledge representation that address this challenge. A separate section to each of the above topics is dedicated following a uniform outline: definition, organization, and use.

Keywords: Concepts, Knowledge, Meaning, Modeling, Ontology, Semantics

Sustainable Development: Theory, Practice and Public Policy Formation

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Sustainable Development as an emergent field of inquiry and application has tumbled onto the public stage before it and its dynamics had been fully worked out. This precluded the unfolding of the scientific clarity of thought, opening it up to anyone who wanted to claim it for their own narrow agendas, as Professor Victor has so eloquently opened. Thus, because this interdisciplinary field of practice and theoretical inquiry has become a socio-political grab bag, its essential power to solve important problems of sustainability has been blunted. However this need not be the case if one pauses to consider the importance of theory and its relevance to practice and public policy formation.

Keywords: A Unified Field Theory of Adapted Space, Ecological Footprint Analysis, Public Policy, Sustainable Development, Theory

Building communities of practice using learning management systems. A comparative study.

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In this paper the authors compare and contrast the efficacy of using learning management systems (LMS) to build communities of practice in three different settings. The notion of a community of practice is defined and the different groups described. The first group are university lecturers from an engineering faculty who are undertaking a teacher training course. The second group were out-of-work people with at least three years college education who enrolled in a project aimed at strengthening the participants' position in their search for employment. The third group were immigrants who had won training positions at a large car manufacturer and as part of their training were required to learn English and Swedish. Three different LMS were used, namely PingPong, WebCT and It's Learning. The paper describes the way in which the three LMS were used and concludes that in all cases using the LMS increased the computer literacy of the participants. More importantly it helped build a community of practice where people with similar goals could exchange ideas, assist with each others learning and receive help from a qualified instructor. The authors argue that pedagogically the focus on a specific aim (learning a language, getting a job, giving feedback about a project) helped the participants to relax in using the technology, increased networking and made learning more fun.

Robert Williams Wood: a practical physicist of exceptional talent

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Robert Williams Wood tends to be remembered for a single event in his life. He was the American who exposed Blondlot's error in believing that he had discovered N-rays. This has to be amongst the most often repeated story in modern physics and is interesting and exciting as it shows science at both its best and its worst. However usually in the telling of this story, Robert Williams Wood's own history and important discoveries are omitted. This paper is intended to restore the balance and tell the story of a man with a long and distinguished career in practical physics, who was a contender for a Nobel Prize in physics.

Towards multilingual Semantic Web with e-speranto

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E-speranto is a formal computer language for recording multilingual texts on the Web. Its syntax is based on XML. E-speranto is therefore compatible with HTML and can be incorporated into Web pages. Although primarily intended for multi-lingual translation by utilizing the existing Web infrastructure, e-speranto owns many properties that could also classify it as a Semantic Web technology. The Semantic Web is a vision of the future Web with the structure of information that is understandable to computers, so they can perform some tasks instead of humans, such as finding, sharing, and combining information. While the Semantic Web focuses on the semantics of resources and services, e-speranto is used for recording the semantics of the textual content. The use of e-speranto enables machine interpretation of the content in natural languages, semantic searching for the information and automated reasoning. In this paper, we point out the main characteristics of e-speranto and discuss similarities between e-speranto and existing elements of the Semantic Web. We also present the prototype implementation of the translation system based on e-speranto.

Keywords: e-speranto, Semantic Web, XML, RDF, metadata

Schema: Building blocks for Internet instruction

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This paper is a conceptual paper that sketches a brisk walk through some of the current ideas about the pedagogy and theories of learning to illustrate a diverse set of beliefs and the scatter of ideas surrounding best practice, especially related to use of the internet as an educational tool, relying on the belief systems. It then introduces the notion of schema, a small unit of meaning in learning. For the authors, the notion of schema may be foundational in looking at the "wholes" and holes in current ideas of how we learn.

Marketing Decision Support Systems

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In modern-day business conditions marketing managers control a great number of information, both from external and internal organization environment. Some of the information play significant role in a process of upgrading business results, while others may be considered less important or completely irrelevant. In this, highly sophisticated environment, marketing managers can make a lot of mistakes. Often, relying on intuition, they apply decision-making criteria that lead to a preconceived solution. So far have been conducted many researches that show that employment of decision support systems (DSS) results in a better competence of a decision maker. Marketing decision support systems (MDSS) are considered efficient because they help the decision maker to identify criteria relevant to a particular decision, which makes the final decision, based on these criteria, significantly better. Under ideal conditions the decision maker should use MDSS as an enabler for activities of communicating, structuring and better understanding of a problem. Merging MDSS and artificial intelligence (AI) one opens a new field for research and application in the sphere of marketing decision support systems. This kind of system, Intelligent Decision System (IDS), could be even more efficient, more intelligent and better assistant in marketing decision-making process.

Testing Of DMS Analytical Function Library With Scheme Mutation Method

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This paper presents the method applied in testing of analytical functions library of distribution management system (DMS). Method described in this work is designed to randomly change the structure of distribution network scheme. Purpose of this approach is to test DMS reliability in case of network structure changes. Important general characteristics of the statistical testing method are outlined as well as specific decisions made in this case.

Objective Knowledge as Method

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We analyze some ideas of objective knowledge as (1) an agent to implement content retrieval, (2) a method in objective-oriented language, and (3) conjectured diagnosis. We then specify the ideas by a formality so that we may interpret objective knowledge as method. Since the method contains implementable views, we can see that objective knowledge may be not only data, but also procedures. By means of a diagnostic system practice, we may acknowledge such an aspect of objective knowledge.

William Franklyn Hudgings, his life and his Little Blue Book on relativity

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William Franklyn Hudgings wrote the Little Blue Book #408 Introduction to Einstein as his only contribution to Emanuel Haldeman-Julius's Little Blue Book series. I have an interest in Little Blue Books as a means by which the poor of America obtained some initiation into the world of science. This brief research will reveal Hudgings as a very strange character, but it will also show that his one Little Blue Book probably has sold more copies than any other work explaining relativity. In this sense, William Franklyn Hudgings is significant in the public understanding of modern physics.

A First Language Boost to Second Language Reading

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This paper presents a study done with four classes of 11-13-year-olds at a Swedish school with 67% of the school population having another first language than Swedish. Two of these classes were experimental groups and two were control groups. Students with Swedish as a second language were at-risk readers in these classes. The experimental groups worked on various tasks to improve their proficiency in their first languages, while the control groups worked as usual. Finally, their reading comprehension in Swedish was assessed, and the second language students in the experimental groups performed better than the ones in the control groups.

Keywords: reading comprehension, at-risk students, first language proficiency, second language development

Methodology for Written and Oral Presentation of Research Results

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Objective Knowledge and Reasoning for Automated Diagnosis

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As in application of DSM (Diagnostic and Statistical Manual of mental disorders) to decision of disorders caused by syndromes, the expert (who is not always a doctor) may take a role of interaction between the patient and the automated system based on DSM. However, the automated system does not necessarily make the expert capability useful, as long as the expert is just an auxiliary agent between them. We incorporate a significant function (role) into the whole diagnostic process for the expert (agent) to make some conjecture diagnosis against suspicious syndrome, before the query-answer mental stage for each cause syndrome with reference to conjecture diagnosis. In general, we interpret conjecture diagnosis as objective knowledge, while conjecturing is based on reasoning. This manner can be generalized to design scheme for automated diagnosis of two stages: (1) the function of an expert agent, considered as conjecturing diagnosis (2) the verification of conjectured diagnosis, whether it is automatic or re-examined from professional views.

Keywords: Intelligent systems (ISY), Knowledge structure, Reasoning