

Selected Publications of Doncho Petkov, Ph.D.
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Introduction

My research has been predominantly in the area of applications of multicriteria decision analysis (MCDA) and systems thinking to Information Systems (IS) management, software engineering and complex managerial problems. However it has also branched in several other areas like software development productivity, telecommunications planning, web software development and testing, information systems education, some artificial intelligence methods like case based reasoning, genetic algorithms and neural networks. I have worked in the past also on application of systems thinking and MCDA to environmental and societal developmental problems.

Work in Software Engineering:

Overview: In the area of software engineering, my most important paper prior to 2000 is on a decision model with AHP for prioritizing the factors affecting software development productivity published in the Journal of Systems and Software, whose main ideas were suggested by me though my co-authors contributed with their knowledge of productivity issues in IS. Then I would mention my 2007 paper published in the Information Resources Management Journal (with K Sewchurran) on using Soft Systems Methodology and the Unified Modeling Language (UML) in a large IS design project and the conceptual paper on Software Engineering, Information Systems and The Systems Approach (co-authored with D Edgar-Nevill, R Madachy and R O'Connor) that is to appear in the first 2008 issue of the International Journal on Information Technologies and the Systems Approach as is evident from the selection of my most important papers in this group that follows:

- Petkov, D., Edgar-Nevill, D., Madachy, R. and O'Connor, R., Information systems, software engineering and Systems thinking – challenges and opportunities, *International Journal on Information Technologies and the Systems Approach*, 2008 (1), (in print).
- Sewchurran, S., Petkov D, (2007), A Systemic Framework for Business Process Modeling Combining Soft Systems Methodology and UML, *Information Resources Management Journal*, 20(3), 46-62, July-September 2007.
- Mora, M. Gelman, O, Forgionne, G. Petkov D and Cano, J. Integrating the fragmented pieces in IS research paradigms and frameworks – a systems approach, *Information Resource Management Journal*, 20(2), April –June 2007, 1-22.
- M.J. Mhlabane, D. Petkov, T. Nepal, An investigation into performance testing for e-commerce web-based applications, Proceedings 7th Annual Conference on World Wide Web Applications, August 2006, Cape Town, <http://www.uj.ac.za/www2005/index.asp?page=detail&id=3035>.
- Petkova O and Petkov D, Factors Affecting Software Development Productivity in an Outsourced IT Project, *Journal of Information Technologies Cases and Applications*, (Ivy League Publishing), Vol5, No1, 2003, 5-22
- Petkova O, Roode JD and Petkov D, A multiple perspectives evaluation of the factors affecting software development productivity in an outsourced IT project. *South African Computer Journal*, 26, 2000, 45-52.
- Finnie, G., Wittig, G. Petkov D. Prioritizing Software Development Productivity Factors Using the Analytic Hierarchy Process, *The Journal of Systems and Software*, (Elsevier Science Publishers), August 1993, 129-139.
- Petkov, D., and Petkova, O., A Critical Review of Past Research of Factors Affecting Software Development Productivity, *Proceedings of IS One World Conference*, April 14-16, Las Vegas, USA, 2004.
- Petkova, O., and Petkov, D., Towards Reduction of Subjectivity in the Evaluation of Factors Affecting Software development Productivity, *IS OneWorld Conference Proceedings*, Information Institute, Las Vegas, April 2003.

Petkova, O., and Petkov, D., Towards Reduction of Subjectivity in the Evaluation of Factors Affecting Software development Productivity, *IS OneWorld Conference Proceedings*, Information Institute, Las Vegas, April 2003.

Petkov, D., J. Viloen, A Model of the Prioritization of Factors Related to CASE Tools Selection, *Second Int. Information Management Talks*, Kubova Hut, R. Oldenburg Verlag, Wien-Munchen, 1994, ISBN 3-70290394-1

On theoretical and practical problems in Information and Communication Technologies:

Overview: In my work I have attempted to address also certain important theoretical issues in the theory of IS like validation of information systems, overcoming paradigm incommensurability in multimethod research, development of executive information systems and the role of the technology acceptance model. These are closely related to the evolution of my overall research agenda over the last 10 years from the area of MCDA to the new and evolving field of Problem Structuring Methods or Soft Systems Thinking applied to Information Technology management and rural telecommunications development. The most significant are a pioneering paper in that area is my 2007 publication in *Decision Support Systems*, as well as the 2003 paper in *Telecommunications Policy*, co-authored with Theo Andrew among several other papers that are listed below:

Petkov, D., Petkova, O., Andrew T. and Nepal T. Mixing Multiple Criteria Decision Making with Soft Systems Thinking Techniques for Decision Support in Complex Situations, *Decision Support Systems (Elsevier Science Publishers)*, Vol. 43 (2007), 1615-1629.

Petkova, O., Petkov, D. and D'Onofrio, M.J. "What lies beyond Virtual Community Informatics – expanding a research agenda", *Journal of Information Technology Theory and Applications (JITTA)*, Vol 8(1). 2006, 49-62.

Petkov, D., Petkova, O., Andrews, T., and Nepal, T. (2006) "Paradigm Issues in Critical Systems Thinking and Their Interpretation in Three Developmental Systemic Interventions", *Proceedings of the 50th Annual Meeting of the International Society for the Systems Science*, July 9-14th, 2006, Sonoma State University, California, USA.

Andrew T. and Petkov D. A Case Study on the Initial Enquiry Stage in a Framework for Improved Planning of Rural Telecommunications Infrastructure in Developing Countries, *International Journal on Technology Management*, (Inderscience Enterprises, Switzerland) Vol 31 (1/2), 2005, 64-78.

Petkova O and Petkov D., A Holistic Approach towards the Validation and Legitimization of Information Systems, *Kybernetes, The International Journal of Systems and Cybernetics*, (Emerald Publ.), Vol. 32, No 5-6, June 2003, 703-714.

Andrew T.N and Petkov D., The Need for a Systems Thinking Approach to the Planning of Rural Telecommunications Infrastructure, *Telecommunications Policy*, (Pergamon-Elsevier Science Publishers) Vol 27, No 1, 2003, 75-93.

Petkov D and O Mihova-Petkova The Analytic Hierarchy Process and Systems Thinking, in Stewart T.J. and van der Honert R.C. (Eds), *Trends in Multicriteria Decision Making*, Lecture Notes in Mathematics and Mathematical Systems, Springer, Berlin, 1998, Vol 465, 243-252.

Petkov, D., One Way to Propagate Management Policies in a Decentralized Decision Making Environment, in *Cybernetics and Systems*, (ed. R.Trapp), Vol.2, 1191-1198, World Scientific Publishing, Singapore, 1994.

Petkov, D., and Petkova, O., A Multi Criteria Evaluation of Outsourcing Decision, *Second Annual International Outsourcing Conference*, New York, August 25-26, 2003.

Petkov D., Petkova O., D Onofrio, M. and Fry G., Enabling the application of CSF theory to web development for e-commerce in a regional context, *International Virtual Community Informatics Workshop*, held in conjunction with ICIS2002, Barcelona, Spain, 15 Dec 2002.

On Information Technology technical aspects and on IT management – here the potential list is probably the longest but I have included just the following papers:

Averweg U, Petkov D., Erwin G. And Moolman H. *Impact of portal technologies on EIS implementations in organizations in Kwa Zulu Natal*, *South African Journal of Information Management*, Vol 5(4), December 2003.

- Wortmann, KL, Petkov D and E. Senior, *Indexing in a Case-Based Reasoning System for Waste Management*, *South African Computer Journal*, Issue 23, 72-84, 1999.
- McCarney L, D. Petkov and R Ross, *Modeling the relationships between factors affecting the marketing of upgrades for personal computers*, *SA Journal of Business Management*, vol. 28 (1), 1997, 27-32.
- Petkov, D. and Petkova O., *Making decisions in Information Technology Outsourcing*, *Fifth International Conference of the Decision Sciences Institute, Athens, Greece, July 1999 (invited paper)*.
- Petkov D. and O. Petkova. *Towards a learning organization: a combination of reengineering and SSM*, *Proceedings Fifth Interdisciplinary Information Management Talks IDIMT'97, Zadorf, R Oldenburg Verlag, Wien-Munchen 1997, pp 95-108*.
- Petkov D. An approach for the standardization of policies for selection of computer hardware and software, *SA Computer Journal*, Vol 16, April 1996, 13-17.
- Schreuder, P., D. Petkov and L. Haines, *Preference Assessment in AHP with Interval Judgments Using Neural Networks*, *Association for the Advancement of Modeling and Simulation Techniques in Enterprises (AMSE) International Pretoria Conference "Intelligent Systems '94"*, September 1994, ISBN2-909214-605

On environmental and developmental decision making

Like my research in the IT area was helping me in staying current and relevant in my IS teaching, my work in environmental and developmental decision making informed my teaching of systems thinking at the School of Environment and Development and the Leadership Center of the University of Natal and in the masters in organizational management program at ECSU. This line of research merges with my IS efforts in my work on bringing together Community Informatics and Community Operations Research which is one of my recent contributions over the last years in that area as they are shown below:

- Nepal T. and Petkov D. An action research oriented systemic framework for the evaluation of rural telecommunications infrastructure, *Proceedings 11th Australian-New Zealand Systems conference*, Christchurch, New Zealand 5-7 December 2005.
- Zelger J, de Wet A G, Pothas A-M, and Petkov D, *Conceptualization with GABEK: Ideas on Social Change in South Africa*, in Zadeh, L.A. and Kacprzyk, J. (eds), *Computing with Words in Information/Intelligent Systems Vol. 2*, Springer Verlag, Berlin, 1999
- Kunene N, Petkov D., *Reducing the animosity associated with high-polar group decision environments by reversing traditional procedures to emergent consensus building with the use of GSS embedded capacities (through the AHP and consensus indicators)*, *ISOneWorld Conference Refereed Proceedings*, March 30-April 1st 2005, The Information Institute.
- Petkov, D. , Petkova, O., & D'Onofrio, M. *Comparative Comments on Community Informatics and Community Operations Research*, *Proceedings of the Decision Sciences Institute 2004 Annual Meeting* , Boston, Massachusetts, November 2004
- T Nepal and D Petkov, *Towards a soft systems approach to the evaluation of rural telecommunications infrastructure*, *IFIP WG8.4 Conference*, Bangalore, India, May 2002.
- Huntley R, Petkov D, Archer D and Fincham R, *Soft Systems Thinking and MCDM as tools and techniques to aid in the evaluation of development proposals*. *Proceedings Eco Management and Auditing International Conference*, Manchester Business School, June 2000, p131-140.
- McEwan, T. and Petkov, D., *A Pluralist Approach Towards the Integration of Quality and Environmental Management, leading to Sustainable Development*, in A. Gregory (ed). *Synergy Matters: Working with Systems in the 21st Century*, Plenum Press, New York, 1999, 229-234.
- Petkov D. McEwan T., von Solms S., Vezjak M., *Moving Towards Compliance with Standards for Environmental protection - an Example of Mixing Approaches to "Messy" Problems*, *Proceedings of the Fourteenth European Meeting on Cybernetics and Systems Research*, Vienna, Austrian Society for Cybernetic Studies., Vol.1, 252-257, 1998.
- Petkov D. A model for the prioritization of factors affecting child survival, *Development Southern Africa*, Vol 12 No 6 1995, 815-822.

On IT education

I have been interested for many years in IS education, academic computing and academic management. In particular I have published recently a paper on assessment in *Journal on Issues in Informing Science and Information Technology* in 2006 and have another paper accepted for *ISEDJ* on the use of the Work

System Method in an IS introductory course. A past paper of mine in the same journal reported on a case study on the evaluation of the introduction of WebCT at a university. I see that line of my research as an important element of all other efforts needed to improve the quality of teaching. I have been involved also in several smaller projects related to managerial problems in academia and in academic computing as is evident from the selection below:

- Petkov D and Petkova O. The Work System Model As A Tool For Understanding The Problem In An Introductory Is Project, *accepted for the Information Systems Education Journal*, Vol. 6. 2008.
- Petkov, D. and Petkova, O. "Development of Scoring Rubrics for Projects as an Assessment Tool across an IS Program", *Journal on Issues in Informing Science and Information Technology (IISIT)*, Vol. 3, 2006, 499-509.
- Michele, D., Petkov, D and Kleine, P., Post Implementation Review of an Introduction of WebCT, *Information Systems Education Journal*, Vol. 4 (16). 2006.
- Petkov, D., G.Finnie, V. Ram, A Comparison of Undergraduate Programs in Information Systems in Southern African and North American Universities, *South African Journal of Higher Education*, Vol 9, No.1 (1995), 116-121.
- Petkov D and O Petkova, A Systemic Framework for the Analysis of Academic Computing, in Baic V.B. (ed), *Advances of Systems, Signals, Control and Computers*. IAAMSAAD and the SA branch of the Academy of Nonlinear Sciences, 1998, Vol III, 398-403.

Conclusion

My research reflects to a degree the diversity of the IS field as it spans technical and managerial aspects of Information Systems and Software Engineering. On the theory side my efforts were coherently evolving from my early interest in MCDA and the Analytic Hierarchy Process to soft systems thinking (or alternative OR as it is also known) and to multimethodology. I have contributed to the latter area both theoretically and practically. I have been trying to assist in a humble way in the past decade towards bringing together MCDA and Systems Thinking and the development of several multimethodology frameworks for mixing methods in solving complex problems in the Information and Communications Technologies sector that have been applied in practice in the area of software engineering and also in telecommunications planning and evaluation. The relevance of my work for this cutting edge research area has been reflected also in the special issues that I have edited on applying Soft Systems Thinking to technical problems and to Information Systems and my involvement in the editorial board of the most significant international journals in that area like IJITSA and Systems research and Behavioral Science. It has been recognized also through my nomination to serve on the program committees of more than 20 international conferences. Complete details are provided in my full CV.

My research has been reported in more than 92 refereed papers in journals, books or refereed conference proceedings and more than 100 other non-refereed papers and presentations. My papers have appeared in Decision Support Systems, The Journal of Systems and Software, Information Resources Management Journal, JITTA, The International Journal on Technology Management, International Journal on Information Technologies and The Systems Approach (IJITSA), Kybernetes, South African Computer Journal, The International Journal on Telecommunications Policy and Management, Journal on Information Technology Cases and Applications Research, South African Information Management Journal, Management Dynamics, South African Business Management Journal, Development South Africa, South African Journal of Higher Education and elsewhere. I have served as a reviewer for a number of publications and conferences. I chaired the Systems and IS track at the ISOneWorld 2007 conference and is on the program committee for the International Digital Government Research Conference 2007 and also for the International Conference on Information Resources Management in 2008 in Canada. I am a member of IEEE Computer Society, Association of Information Systems, International Society for Multicriteria Decision Making, and previously was involved with DSI, INFORMS, ORSSA, CSSA, UK Systems Society.