Centre for Informatics and Applied Optimization

C I A O   Newsletter

http://www.ballarat.edu.au/itms/ciao.shtml

May   2003   **Edition 2**

Breaking News ....

Successful Grants – Chinese Higher Education Strategic Initiative Grant
            Victorian Department of Human Services (DHS) Grant

Successful Grants.....

The Chinese Higher Education Strategic Initiative Grant

The Hon Dr Brendon Nelson, Minister for Education, Science and Training announced the awarding of $585,000 to further strengthen research partnerships between Australian and Chinese universities.

The funding will enable Australian universities to take part in a new Commonwealth Government research programme between Australia and China.

The Chinese Higher Education Strategic Initiative (CHESI) will help build the research potential of Australian universities and enable them to work more closely with their Chinese counterparts.

The initiative aims to promote education, training and research cooperation between Australian and Chinese universities, to raise the profile of Australia's quality research and education system within China and to promote a greater awareness of the benefits of working together. Two-way research exchanges are encouraged through a range of activities including onsite visits and postgraduate research training opportunities in China.

Eight Australian universities were selected by application to take part in the program.

Among them the University of Ballarat and Curtin University. CIAO (UB) and WACEAO (Western Australian Centre of Excellence in Industrial Optimisation, Curtin University) received $161,000 for their joint project "Complex Industrial Optimization – Mathematical Modelling". The project involves cooperation with 8 Chinese leading institutions in the area of optimisation (Beijing University, University of Science and Technology of China, Shanghai University, Chinese Academy of Sciences (Beijing), Fudan University, Chongqing Normal University and Hebei University). Researchers from Australia will visit China and 16 researchers and PhD students from China will visit Australia through one of the schemes: China-Ballarat-Perth-China or China-Perth-Ballarat-China.   An Australia- Chinese optimization workshop will also be held in Ballarat.

Victorian Department of Human Services (DHS) Grant

Evaluation of the Victorian Nurse Back Injury Prevention Program

The University of Ballarat, through VIOSH Australia, the occupational health and safety agency of the School of Science and Engineering, together with the School of Information Technology and Mathematical Sciences (ITMS) and other specialist associates from UB and the University of Melbourne, has won a Victorian Department of Human Services (DHS) tender to undertake an evaluation of the Victorian Nurse Back Injury Prevention Program (VNBIPP). The grant totals $120,000 of which the School will receive $51,800. Congratulations Mr Peter Martin and Dr Jack Harvey.

VNBIPP has provided over $7 million in funding to Victorian public health care facilities over the period 1999-2003, to implement Back Injury Prevention Programs based on 'No Lifting' principles. The program has addressed unacceptable and rising injury numbers in nurses, by eliminating or minimising manual handling when moving patients. This has been

achieved through the provision of patient handling aids and equipment, raising the awareness of nurses, and encouraging nurses to be proactive in identifying hazards and reducing risks of injury in the workplace.

The evaluation project will address outcomes through a longitudinal statistical analysis of injury and claims data, as well as seeking to identify key success factors and assessing sustainability. The evaluation team will also develop and validate a competency assessment tool for nursing staff with regard to 'No Lifting' work practices.

ICOTA6 ......

The next ICOTA will be held from December 9 to December 12, 2004.

The International Conference on Optimization: Techniques and Applications (ICOTA) is a conference series. The goal of ICOTA is to provide an international forum for scientists, researchers, software developers, and practitioners to exchange ideas and approaches, to present research findings and state-of-the-art solutions, to share experiences on potentials and limits, and to open new avenues of research and developments, on all issues and topics related to optimization.

It had been advertised that the next ICOTA would be held in Ballarat from September 26 till September 28, 2004. After this advertisement we were advised by many of potential attendees of ICOTA that this time slot was not convenient for them and they would not be able to attend. ICOTA is an official conference series of the Pacific Optimization Research Activity Group (POP). After discussions with members of the POP Board and people organizing previous conferences of this series, the decision was made that the best time for the next ICOTA is December 9 -December 11, 2004

The web site of ICOTA is now available (see http://www.ballarat.edu.au/itms/orb/ICOTA/index.htm
Thanks to Rachel Naus for preparing the web page.

Rural Ambulance Victoria

Associate Professor John Yearwood, Professor Alex Rubinov, Ms Carmel Haynes Dr Andrew Stranieri, Mr Peter Martin, Assoc Professor John McDonald, Mr Greg Simmons and Mr Ross Davey met with the Rural Ambulance Victoria's (RAV) senior team Mr Doug Kimberly, Mr Mark Vanzuylekom, Ms Desiree Harker, Mr Terry Ryan, Mr Stephen Gough and Mr David Stephens to present CIAO's capabilities and for the RAV to outline their operations and research opportunities on March 31st 2003

Ballarat Health Services

The CIAO Executive, Dr Andrew Stranieri, Ms Carmel Haynes, Associate Professor John Yearwood, Professor Sidney Morris and Professor Alex Rubinov met with the Ballarat Health Services executive staff Dr I Graham, Mr D Fraser, Mr M Scarlett, Ms S Donovan, Mr T Olsson, Ms W Hubbard and Chief Executive Officer Mr Alan Hughes on 25th February 2003.

The meeting has resulted in an agreement on some grounds for research collaboration. Associate Porfessor Cecil Deans now has a joint position at UB (Nursing) and BHS with a charter to foster research collaboration and development.

Honorary Senior Research Fellows ....

Dr Ken Harvey from the School of Public Health at LaTrobe University and **Dr Iradj Ouveysi** from Telstra Research Laboratories have been appointed Honorary Senior Research Fellows in CIAO, University of Ballarat. These appointments will formalise Dr Harvey and Dr Ouveysi's extensive involvement in research and post graduate degree supervision. We thank them for their involvement so far and look forward to working more closely with them in the future. Welcome to CIAO.

Visitors to CIAO ....

Professor Uri Passy from the Technion –Israel Institute of Technology visited CIAO from March 30 till April 4. Professor Passy is an expert in multi-criteria optimization and operations

research. His current research relates to Data Envelope Analysis that deals with efficiency analysis of production systems and estimation of production functions. This in an interesting topic of research which is closely related to CIAO activity. Professor Passy and Professor Alex Rubinov had some interesting discussions.

Professor Hossein Mohebi from the University of Kerman (Iran) will spend his one year sabbatical leave in Ballarat commencing at the end of July 2003. Professor Mohebi is an expert in functional analysis, his research relates to best approximation in Banach spaces. Professor Mohebi is interested in a new approach to best approximation, which has recently been developed by Professor A. Rubinov and I. Singer and he plans to work in this direction in Ballarat.

Research Projects ....

Ballarat Constipation Study
Dr Jack Harvey is co-author, along with principal researchers **Dr Mark Yates** and **Ms Keren Day** of Ballarat Health Services, of the recently completed final report of the Ballarat Constipation Study (Day, K., Yates, M. and Harvey, J., 2002, *Ballarat Constipation Study: The Objective Assessment of Constipation in the Elderly in Residential and Sub-Acute Care.* Ballarat Health Services.). The research, into the objective assessment and improved management of constipation in elderly people in extended care and residential facilities, was funded by a grant from the Department of Human Services.

VicHealth Partnerships for Health Program
Dr Jack Harvey is part of a multidisciplinary University of Ballarat team which has been awarded a $48,000 6-month contract by the Victorian Health Promotion Foundation (VicHealth) to design an evaluation plan for the new 3-year $25m *Partnerships for Health* program. VicHealth distributes funds raised by a levy on tobacco products. For the decade since VicHealth was established, a straightforward sponsorship model has been used, with sporting organisations essentially being given grants to display health promotion messages. The new program is both more decentralised, through a wider range of state sporting associations, and more community and activity focussed, through regional sports assemblies. It is aimed at increasing grass-roots participation in sport and active recreation, and in providing healthy venues and health-committed organisations through which to do so. This is a bold step into a much more complex set of grant arrangements, requiring fundamental organisational changes seeking much more engagement and commitment from all stakeholders.

The eight member UB team is led by Professor Warren Payne and includes six staff of the School of Human Movement and Sport Sciences, together with Assoc Prof John McDonald of CHIRP and Dr Jack Harvey of ITMS/CIAO. It is anticipated that following the 6-month evaluation design phase, the UB team will be well positioned to bid for the contract for the full 3-year evaluation.

Daylesford Virtual Practice Amalgamation Project
Dr Jack Harvey has completed a contract to evaluate the *Daylesford Virtual Practice Amalgamation* project, undertaken by Ballarat and District Division of General Practice, in which two groups of general practitioners and Hepburn Health Services instituted arrangements for sharing of patient records via secure IT links in order to improve after-hours services and reduce duplication and inefficiencies.

Healthy Men Project
Dr Jack Harvey has joined the Steering Committee of the Healthy Men project, with particular responsibility for project evaluation. This project is a joint initiative of Ballarat and District Division of General Practice and Child and Family Services Ballarat, funded by the Victorian Department of Human Services. It is aimed at developing a workplace-based model for encouraging increased participation of men in matters of health and wellbeing.

Ballarat and District Pharmacy Alliance Project
Dr Jack Harvey has joined the Steering Committee of the Ballarat & District Pharmacy Alliance (BDPA) project. This is an ongoing project funded by the Pharmacy Guild of Australia and administered by Ballarat and District Division of General Practice. It is aimed

at building and maintaining a network of pharmacists and carrying out associated research activities. As well as providing design and analysis services for specific research projects undertaken by BDPA, Dr Harvey will now also assume responsibility for overall evaluation of the current phase of the BDPA project.

CIAO Reports ....

Distributed Simulation Laboratory (DSL)

The annual Simulation Industry Association of Australia (SIAA) SimTecT conference in Adelaide (May 26th-30th) will be the public debut for the DSL. We will have a booth at the conference exhibition at which we will be publicising our short course offerings in Distributed Simulation and High Level Architecture (HLA) as well as the more general mission of the DSL.

Dr Philip Smith, Dr John Wharington and David Stratton have a refereed paper "Tools To Assist With HLA Pedagogy " accepted for presentation at the conference which describes some of the innovations that are being used in our short course presentation.

The first half of the short course, which targets non-programmers, and presents an overview of the HLA is being delivered in late April to the Army Simulation Wing at Pukapunyal. The course has been quite extensively enhanced to include a larger degree of practical work with the HLA that is accessible to non-programmers.

The DSL is involved in the emerging proposal of an open Runtime Infrastructure (RTI) for HLA. The RTI is the central, system software component required by all HLA simulations. Currently, the global HLA community does not have access to a supported, full-function and up to date RTI that is not a commercial product. This represents an, often significant, financial dis-incentive to HLA development which is a possible limiting factor in the application of the HLA to new domains.

The DSL is currently tendering for a further HLA related research contract with the DSTO.

Mathematical and Statistical Analysis Research Group (MASARG)

As well as the items reported on above, we have the following:

Professor Alex Rubinov is presently on an extensive trip to Europe (from May 1 until July 4). Professor Runinov's main goal for this trip is joint research with French and Spanish experts. He will also give seminars at universities and attend two conferences at which he has been invited to give three lectures.

Joint projects:

1. Abstract convexity.
Convexity is a very useful notion, however, the convexity hypothesis is restrictive for some applications so many different generalizations of convexity were proposed. Two of these generalisations have the same name: Abstract Convexity. There is functional abstract convexity (Alex is an expert in this field) and topological abstract convexity. For those who know the definition of topology it will be very interesting to compare it with the main definition of topological abstract convexity (see this definition in the appendix to this note). These two branches of abstract convexity are very different, however they have the same source, so it is very interesting and important to find some links between them. Professor Charles Horvath (University of Perpignan, France), who is an expert in the topological abstract convexity, invited Alex to visit him and discuss a possible joint project on this topic.

A small informal workshop with invited leading French experts in optimization will be held in Perpignan and Alex will give a lecture at this workshop.

2. Monotonic Analysis.
Professor Juan Enrique Martinez Legaz collaborates with Professor Alex Rubinov in the development of monotonic analysis in the framework of a project supported by an ARC discovery grant. The paper "Monotonic Analysis over cones I" by J. Dutta, J E Martinez Legaz and A. Rubinov has been submitted to one of the leading optimisation journals. This paper has recently received good referee reports so it is timely to start "Monotonic Analysis over cones

II"; Juan Enrique invited Alex to Barcelona to start this new project. The work on this paper will be continued in Ballarat when Juan Enrique will visit Ballarat in August.

3. *Mathematical Economics*.
Professor Antoine Soubeyran invited Alex to visit Aix-en-Provence (France) to discuss a possible joint project in the area of mathematical economics.

4. *Nonlinear Lagrangians*.
A draft of a joint paper by J.-P. Penot and A. Rubinov related to nonlinear Legrange-type functions is almost ready. Professor Jean-Paul Penot invited Alex to visit Pau (France) for discussions in relation to this paper.

Seminars

Professor Alex Rubinov has been invited to present lectures at seminars in Limoges, Tolouse, Avignon (France), Alicante and Elche (Spain). The lectures will be devoted to monotonic analysis and its applications, multi-criteria optimisation and nonlinear penalty functions.

Conferences

1. The 38th International Workshop: VARIATIONAL ANALYSIS AND APPLICATIONS will be held in the international School of Mathematics "G.Stampacchia" (Erice, Italy). Professor Alex Rubinov will present two lectures at this workshop: "Monotonic Analysis: duality and converges", and also "On minimization of max-min functions" (this one is based on a joint paper with Dr Adil Bagirov)

2. The International Workshop SMALL SETS IN ANALYSIS will be held in Haifa, Israel. Professor Rubinov will give an invited lecture "Sigma porous sets in monotonic analysis" at this workshop.

APPENDIX: *Convex sets in topological abstract convexity:*

Let X be an arbitrary set. Elements of a totality C of subsets of X are called convex sets if:

1. The empty set and X belong to C
2. The intersection of an arbitrary family of sets from C belongs to C.

3. The union of an arbitrary up-directed family of sets from C belongs to C.

The change of only ONE WORD in this definition will lead to the definition of closed sets, hence to the definition of topology (we get topology if instead of "up-directed" we say "finite").

Data Mining and Informatics Research Group (DMIRG)

Bioinformatics
A paper prepared by Dr A Bagirov, Mr B Ferguson, Mr S Ivkovic, Mr G Saunders and Associate Professor J Yearwood titled: *New algorithms for multiclass diagnosis using tumour gene expression signatures* has been accepted for publication in the international Journal 'Bioinformatics'.

Data Mining Tools
Ivkovic S., Yearwood J. and **Stranieri A.** '*Visualizing Association Rules for Feedback within the Legal System*' to appear: Conference: International Conference on Artificial Intelligence in Law -
ICAIL 03 in Edinburgh, Scotland – UK 24 - 28 June 2003.

The paper describes the development of the software "Web Associate" a web-based data mining tool using association rules in a novel way that permits data mining by in-house experts:

Health Informatics
A Joint Project by the Health Informatics Society of Australia HISA and Commonwealth Department of Health and Ageing prepared by Associate Professor Jeffrey Soar, Anyes Marsault, Dr Tony Sara, Dr Christopher Mount, Ms Jenni Hardy, Ms Wendy Swinkels and Associate Professor John Yearwood was published in the September 2002 edition of Health Informatics Education. This can also be access on the Health online http://www.health.gov.au/healthonline/docs/hiefrept.pdf .

Knowledge Modelling
Dr Andrew Stranieri, Associate Professor John Yearwood and Associate Professor Cecil Deans (Nursing) in collaboration with staff from the Intensive Care Unit (ICU), Sue Garner and Sue Gervasoni, at Ballarat Health Services are

developing a pilot project "The Representation of the Decision Making Knowledge used by Intensive Care Nursing Staff" to model the knowledge the ICU nurses use in certain scenarios. The knowledge will be used in the first instance to enhance training of ICU staff.

Text categorization – No Report
Biomarkers project – No Report

Congratulations…

With the approval of his residence permit, I am pleased to announce that Dr Musa Mammadov has joined our staff as a Postdoctoral Fellow.

Tenders ……

Dr Jack Harvey, Professor Dennis Else, John Culvenor, Mr Peter Martin, Assoc Professor John McDonald, Professor Warren Payne and **Assoc Professor Tony LaMontagne** (University of Melbourne) have submitted a WorkSafe Victoria grant. The title of their project is '2003 Evaluation of the Victorian Nurse Injury Prevention'.

Book Chapter Published ….

Harvey, J.T., 2003, Population estimation at the pixel level. In Mesev, V. (Ed) *Remotely-Sensed Cities*. London: Taylor and Francis.

Accepted papers….

Pan H.P. (2003a): *A Joint Review of Technical and Quantitative Analysis of Financial Markets Towards A Unified Science of Intelligent Finance*. 2003 Hawaii International Conference on Statistics and Related Fields. (accepted on Feb 3, 2003)

Pan H.P. (2003b): *Swingtum - A Computational Theory of Fractal Dynamic Swings and Physical Cycles of Stock Market in A Quantum Price -Time Space*. Ibid, (accepted on Feb 3, 2003).

Patel Keyurkumar J. '*Quantitative Study of Abrasive Contamination in a Ductile Material During Abrasive Aqua Jet Machining (AAJM)'* has been accepted for the 2003 WJTA American Waterjet Conference to be held in August 2003.

Patel Keyurkumar J. and **Chen F.L.** '*Quantitative and comparative study of abrasive contamination in ductile and brittle material for abrasive aqua jet machining (AAJM)'* has been accepted for the 7th Pacific Rim International Conference on Water Jetting Technology to be held in Jeju, Korea, from May $19^{th} – 21^{st}$ 2003.

Patel Keyurkumar J. and **Singh V.** '*Next Generation Services: Technologies and Implications',* has been accepted for the International Conference on Computer, Communication and Control Technologies: CCCT '03 and The 9th International Conference on Information Systems Analysis and Synthesis: ISAS '03, to be held in Orlando, Florida, USA on July 31st, August 1st and 2nd 2003.

Keyurkumar J. Patel and **Frank Lin Chen** '*Increasing cut surface quality with various cutting nozzle head oscillations for abrasive aqua jet machining (AAJM)',* has been accepted for publication in Short Communications, Journal of Mechanical Engineering, IMechE, Oxford, UK.

Piece, R and **Stacey, K** (University of Melbourne) '*A framework for monitoring progress and planning teaching towards effective use of computer algebra systems'* has been accepted to appear in the International Journal of Computers for Mathematical Learning.

Ball, L., Pierce, R. and **Stacey, K.** (2003) '*Recognising Equivalent Algebraic Expressions: An important component of algebraic expectation for working with CAS'* has been accepted for the 2003 International Group for the Psychology of Mathematics Education Conference to be held in Hawaii in July 2003.

Bagirov A.M., Ferguson B., Ivkovic S., Saunders G. and **Yearwood J.**, '*New algorithms for multiclass diagnosis using tumour gene expression signatures'*, has been accepted for publication in International journal: Bioinformatics.

Bagirov A.M., Monsalve Tobon J.E. and Beliakov G., '*Parallelization of the discrete gradient method and its applications'*, to appear: Lecture Notes in Computer Sciences, Springer-Verlag.

Ivkovic S., Yearwood J. and **Stranieri A.** '*Visualizing Association Rules for Feedback within the Legal System'* to appear: Conference: International Conference on Artificial Intelligence in Law -
ICAIL 03 in Edinburgh, Scotland – UK 24 - 28 June 2003.

Bagirov A.M. and Churilov L., '*A n optimisation-based approach to patient grouping for acute healthcare in Australia'*, to appear: Lecture Notes in Computer Sciences, Springer-Verlag.

Published papers ....

The following papers have recently been published:

Harvey, J.T., 2002, Population estimation models based on individual TM pixels. *Photogrammetric Engineering and Remote Sensing*, 68 (11): 1181-1192.

Harvey, J.T., Culvenor, J., Payne, W.R., Cowley, S., Lawrance, M., Stuart, D. and **Williams, R**., 2002, An analysis of the forces required to drag sheep over various surfaces. *Applied Ergonomics*. 33 (6): 523-531.

Payne, W.R., Culvenor, J., Lawrance M., Harvey, J.T., Cowley, S., Stuart, D. and **Williams, R**., 2002, Reducing the energy cost of dragging sheep during sheep shearing. *J. Occ. Health and Safety Aust. & NZ*, 18 (2): 173-179.

International interest in the University of Ballarat shearing research

A scientific paper reporting on University of Ballarat research into the ergonomics of sheep shearing, which was recently published in the international journal *Applied Ergonomics*, is the subject of a report featured on the *New Science Update* website (www.nature.com/nsu/ - "Wood makes shearing less of a drag"), published under the auspices of the prestigious UK-based science journal, *Nature*.

The study, initiated by the wool industry in response to high rates of occupational injury, and funded by the Australian Occupational Health and Safety Commission, was designed to provide empirical evidence of the health and safety benefits of low-cost shearing shed modifications.

The current research paper (Harvey, J.T., Culvenor, J., Payne, W.R., Cowley, S., Lawrance, M., Stuart, D. and Williams, R., 2002, *An analysis of the forces required to drag sheep over various surfaces*. Applied Ergonomics 33 (6): 523-531.), which is the second to be published from the study, deals with modifications to the design of the floor of the catching pen, from which sheep are caught and dragged to the shearing workstation

Lead author of the paper Dr Jack Harvey, of The School of Information Technology and Mathematical Sciences, says that the international interest in the paper shows that the University of Ballarat can produce world-class science whilst pursuing objectives of immediate practical benefit to industries, communities and people in the region.

Seminars and Workshops.....

Recent Seminars ....
Julien Ugon **-** Application of optimization techniques to data classification.

28/3/03
John Avery – Do I Really Need an Internet Refrigerator: The What, How and Why of the Semantic Web.

4/4/03
Brent Ferguson – Modular neural network design using a role extraction technique.

10/4/03
Dr Jerome Epstein, Mathematics Dept;, Polytechnic University, Brooklyn, New York 'What is the Real Level of our Students, and What Can We Do About It'.

Forthcoming Seminars

28/5/03
Jason Giri – 'Non-linear Analogues of Lagrange Functions in Constrained Optimization'

Conferences.....

PhD candidate **Simon Barty** presented a paper co-authored with his supervisors **Dr Jack Harvey** and **Dr Chris Turville**, entitled "Data Mining of the Australian Adverse Drug Reactions Database", at the *Australian Health Informatics Conference (HIC 2002)*, held in Melbourne during August 2002. The paper outlined the methodological framework for Simon's PhD research.

Post Graduate News.....

Transfer from Probationary to Full PhD Candidature

Julien Ugon's PhD candidature was confirmed on the 21st March 2003. The title of Julien's talk was 'Application of optimization techniques to data classification'. Professor A Rubinov is Julien's Principal Supervisor and Dr Adil Bagirov is his Associate Supervisor.

Gary Saunders' transferred from Probationary Candidature to Full PhD Candidature. The title of Gary's talk was 'Mathematical and Data Mining Approaches to Study Drug-Reaction Associations from Australian Drug Safety Data'. Professor Alex Rubinov is Gary's Principal Supervisor and Associate Professor John Yearwood his Associate Supervisor.

Graduations .....

Congratulations to ....

Musa Mammadov who received his Doctor of Philosophy at the conferring ceremony on the 13th May 2003. Musa's thesis was entitled 'A *Fuzzy Derivative and Dynamical Systems'*. His supervisors were Professor Alex Rubinov and Associate Professor John Yearwood.

and also

Dora Pearce who received her Master of Information Technology at the conferring ceremony. Dora's thesis was entitled '*Spatial Modelling of the Relationship Between Respiratory Admissions and Ambient Air Pollution'*. Her Supervisors were Dr Jack Harvey and Mr Greg Simmons.

Dr Musa Mammadov and Ms Dora Pearce
after Conferring Ceremony on 13th May 2003.

Research Reports

03/01	Parallelization of the Discrete Gradient Method of Non-Smooth Optimization and Its Applications	A.M. Bagirov, J.E. Monsalve Tobon and G. Beliakov	January 2003
03/02	A new nonsmooth optimization algorithm for clustering problems	A.M. Bagirov and J. Yearwood	January 2003
03/03	Are Schools of Education Failing the Tertiary Mathematics Sector?	Heather Mays and John Yearwood	February 2003
03/04	Max-min Separability	A.M. Bagirov	February 2003
03/05	Unsupervised and supervised data classification via nonsmooth and global optimization	A.M. Bagirov, A.M. Rubinov, N.V. Soukhoroukova and J. Yearwood	March 2003
03/06	Skeletons of finite sets of points	A. Rubinov and J. Ugon	March 2003
03/07	Increasing quasiconcave production and utility functions with diminishing returns to scale	Juan Enrique Matinez-Legaz, Alexander M. Rubinov and Siegfried Schaible	March 2003
03/08	Monotonic analysis: convergence of sequences of monotone functions	A.M. Rubinov	April 2003
03/09	An optimization approach to clustering large-scale datasets	A.M. Rubinov, N.V. Soukhoroukova and J. Ugon	April 2003

All IT&MS staff members and postgraduate students are encouraged to contribute to the next edition of the monthly CIAO Research Newsletter. Examples of newsletter items staff should consider are: projects in process, papers accepted, research in process, publications, grants, seminars, visitors, visits by ITMS staff and Post graduates, scholarships, reports from school research groups / centres, events, conferences, new discoveries, general items of interest, etc. All items should be received by Maxine Kingston no later than the 20th May 2003.

School of Information Technology & Mathematical Sciences,
University of Ballarat.