FACULTY OF ENGEERING AND INFORMATION TECHNOLOGY

ANNUAL REPORT 2003

A. HIGHLIGHTS OF THE YEAR

The Faculty had an outstanding year for research in 2003. The total of ARC income increased by 75% to a point ($3.92m) where it exceeded recurrent funding received by the Faculty. In terms of outcomes, academics in the Faculty published one book, three book chapters, twenty-eight journal articles and sixty-five conference papers. The number of Higher Degree Research students increased from 31 in 2002 to 35 in 2003.

The total number of students studying in the Faculty continued to grow from 1206 in 2002 to 1239 in 2003. Within this figure, a decline in load factor and a decline in the number of students enrolling in the Bachelor of Information Technology program has been offset by the dramatic growth in the number of students enrolling in our Master of Information Technology (eScience) and the new Master of Engineering.

The load taught by the Faculty fell slightly from 593 EFTS to 572 EFTS. The fall was due in part to a significant number of students taking advantage of the new flexibility of our programs and choosing to take an increasing number of courses outside the Faculty. Another contribution to the decline was the falling enrolments in the BIT – a phenomenon experienced by nearly all Australian universities. The fall was offset, to some extent, by the introduction of the ME program in 2003 and the growing enrolments in the MIT (eScience).

The Faculty has embarked on a program to use the previous surplus to invest in new programs at the masters levels. The Master of Engineering was introduced in the first Session of 2003, to augment the very successful Master of Information Technology. These initiatives have funded the growth of the Faculty and the negotiated Enterprise Award pay rises.

Professor Tom Gedeon was appointed Head of the Department of Computer Science from September 2003. Other new academic staff included Dr Yinyu Wan and Dr Ian Wanless in the Department of Computer Science, and Dr Margaret Rossiter and Dr Shad Roundy in the Department of Engineering. The number of centrally funded academic staff numbers in the Faculty stabilized at 37.

B. KEY STATEMENTS OF ACHIEVEMENT AGAINST LOCAL STRATEGIC GOALS

1. *To create a stimulating and challenging educational experience for all our students*
   Both Departments continued a review of their programs and courses. The Department of Computer Science in particular conducted extensive focus group sessions and interviews in order to determine student perceptions of their courses. The results of these surveys were used as the impetus for a number of significant course and program changes planned for 2004.

2. *To be recognized as a leading research Faculty both Nationally and Internationally*
   Outstanding research success - ~$4M in ARC income, 9 new ARC grants commenced in 2003, with a similar number to commence in 2004. One book, three book chapters and twenty-eight journal articles were published by the 37 centrally funded academic staff in the Faculty.

3. *To create a supportive environment to develop all staff to their full potential*
   Maintained support for a wide range of academic and general staff activities including conference attendance, staff exchanges, training courses in information literacy programs and specialized training courses in the university's student and financial management systems.

4. *To seek appropriate partnerships and alliances both academic and business*
   The ANU Industry Alliance conducted a number of activities including a major conference on 'The knowledge revolution in the ACT' attended by over 200 participants.

5. *To diversify our funding base*
   In 2003, recurrent funding to the Faculty comprised 37% of total funding, RTS 8%, IGS 5%, RIGB 2%, ISF 11% and ARC 37%. Continued strong growth in ISF income will further diversify the funding base in future years.

6. *To maintain our outreach activities to ensure that the Faculty is widely known and favorably perceived*
   Members of the Faculty continued the school visits program to every regional college between Armidale and Albury and every ACT school more than once. The Student Services group conducted a very successful Careers Night, Robocup competition, and Open Days.

7. *To ensure that all of our administrative processes are efficient and effective*
   The Faculty actively participated in the Review of Administration and continues to strive to improve its student administration processes.

C. BRIEF SUMMARY REPORTS

SIGNIFICANT ACHIEVEMENTS IN RESEARCH AND TEACHING

Department of Computer Science

Research

The Department research productivity continues to increase. Members of staff published 3 journal articles, 1 book chapter and 17 conference papers during 2003. Members of staff were successful in attracting 1 ARC Discovery grant and 1 ARC Linkage grant in 2003. Total research funding was $6.7K.

Some research highlights for the Department include: Agent Learning for Smart Personal Assistant (Eric McCreath and Robert Bridle for the Smart Internet CRC); Data mining, data cleaning and record linkage (Peter Christen for the NSW Dept of Health and ARC Linkage); Hybrid Legal Expert System (James Popple); Distributed Java Machine/Implementations (Steve Blackburn, Peter Strazdins, John Zigman, Ramesh Sankaranarayana, with 1 continuing, 1 new ARC Discovery); Modern Programming Languages (Steve Blackburn, new Discovery grant); Software Engineering (Clive Boughton and Shayne Flint on Aspect-oriented Systems Engineering for a defence logistics system and architecture project for Smart Internet CRC; Shayne Flint on Capability Dynamics; Ian Barnes on personality type and people's approach to software development); Algorithms (Brendan McKay on efficient algorithms for isomorphism problems, and Weifa Liang on design and analysis of routing algorithms new Discovery grant).

The arrival of Tom Gedeon in October 2003 as a Professor, and Head of Department, with interests in neural networks, fuzzy logic, information retrieval, information visualisation and extraction is expected to lead to the development of a research group in this important and highly productive area.

The Department contributes fractions of two research programmers to the ANU Internet Futures infrastructure and research group, which is giving researchers access to the Grangenet high speed research network backbone through access grid nodes, one of which is in the CSIT building. The Department is also a major participant in the Smart Internet Technology CRC jointly with RSISE Computer Sciences Laboratory. Members of the Department are active participants in 3 ARC Research Network bids.

Teaching

The second cohort of the 4-year Software Engineering program graduated in 2003. The program was introduced in 1999 to meet the software industry's need for better-educated software creators and managers. The degree was accredited by the Institution of Engineers, Australia in 2001. The program includes an introduction to fundamentals of computer science and software in courses that are in common to the 3-year Information Technology programs, going on to the most recent technologies and practices in the advanced years, and includes a major component of industry-related project work.

After seven years of extremely rapid growth in the recent past, the Department's first year student numbers fell slightly compared to 2002 with the UAI increased to 80. The continuing publicity about job losses, and the invisibility of continued growth of employment in the IT industry have had similar, and worse, effects across all Australian universities and many overseas universities. Despite this, the number of international students entering our programs actually increased, thanks to the Faculty's own recruiting efforts. In addition, to meet students' wishes to combine their IT qualification with other university studies, a new service teaching course (Tools for New Media and the Web) is to start in 2004, with a major in IT for the BA in New Media Arts to start in 2005.

The Graduate Diploma and Masters programs in IT(eScience), supported for 3 years by the DEST Science Lectureships Initiative, is generating significant student income, sufficient for the programs to be self-supporting. The number and quality of applications for 2004 indicates further growth. The quality of the program is high and its graduates are well placed to meet both industry and research

Department of Engineering

Research

The Department continues to perform well in terms of research output and grant success. One book publication, two book chapters, twenty-five journal articles and forty eight conference papers were published during 2003. In addition there were six ongoing and seven new ARC research grants. The department continues to work closely with industry, particularly Ford Motor Company, Origin Energy Solar Pty Ltd, Solahart, Roth and Rau Oberflaechentechnik, BPSolar Australia, and Aerosond on a range of funded projects. Total research funding for 2003 was ~$3.7M.

The Centre for Sustainable Energy Systems developed and commenced installation of the Combined Heat and Power System (CHAPS) on the new wing of Bruce Hall (student accommodation) and made further advances in the development of the Sliver® solar cells for Origin Energy. An advanced controller for solar water heating systems and a technique for quantifying the impact of shading on a solar site were developed and work continued on mirrors and receivers for solar concentrating systems.

Another milestone for the Advanced Manufacturing and Production Systems Group (AMPS) was the implementation of the Simpress knowledge based system at the Ford Motor Company's Geelong Stamping Plant and Ford Chennai. Simpress was developed out of research activities in the Department under the ongoing STAMP research collaboration.

2003 marked the tenth anniversary of the first graduates from the ANU BE program. Since its inception the program has graduated 548 engineers who are working in a diverse range of fields.

December saw the Department's Formula Society for Automative Enginners team compete at Talum Bend against an international field of 21 teams. Although it was completed on time and used a novel manufacturing technique for the chassis, there were a number of minor technical problems that resulted in a disappointing final result compared to previous efforts. A team also represented the University at the Society for Automative Engineers Aero West Air Plane Design and Build Competition in California USA.

Teaching

The 2003 academic year saw the implementation of changes to the undergraduate Bachelor of Engineering program These changes build on the traditional core strengths of interdisciplinary systems engineering, and allow students to define major streams within their degree. The new rules allow a greater degree of flexibility for students choosing from two technical majors. The Master of Engineering program commenced in 2003 with an initial intake of twelve. The growth of this program is promising for the Department.

The undergraduate engineering students continue to form a cohesive group on campus. The Engineering Students Association organised many social events culminating in the successful Engineering Ball. This social interaction is an important aspect of life within the Department.

D. COMPLETIONS AND ATTRITION

The average attrition rate for undergraduate programs in the Faculty of 6.4% compares favourably with the Faculties average of 7.2%. In the report, the only feature of concern was an apparent 23% attrition for the Coursework masters program. Investigations showed that this was related to a small number of enrolments (13) and the fact that a number of domestic students were enrolled part time and varied their workload according to personal circumstances from time to time. We do not believe that this factor represents a significant problem with the program.

E. NEW GRANTS

2003, *Design Efficient Routing Protocols for WDM Optical Networks*, Dr W. Liang, ARC Discovery Grant, $50K

2003, *Surface and Strain Measurement Facilities for the Investigation of Intelligent CAD Approaches,* Professor M. Cardew-Hall, ARC Linkage Grant, $160K
2003-2004, *Research Project IE-05 IEContext Pelican II*, Dr C. Johnson, CRC for SmartInternet Technology, $136K
2003-2005, *The LASSE Process*, Professor A. Blakers, ARC Discovery Grant, $180K
2003-2005, *Overcoming Performance Limitations in Multicrystalline Silicon Solar Cells*, Professor A. Cuevas, ARC Linkage Grant, $610K
2003-2005, *Stamp Forming of Lightweight Fibre-Metal Laminate Systems,* Dr S. Kalyanasundaram, ARC Linkage Grant, $213K
2003-2005, *Lifetime Spectroscopy of Impurities in Silicon Solar Cells,* Dr . D. MacDonald , ARC Discovery Grant, $253K
2003-2005, *Image Based Visual Servo Control of Dynamic Under Actuated Systems*, Dr R. Mahony, ARC Discovery Grant, $173K
2003-2005, *Programming Paradigms, Tools and Algorithms for the Spectral Solution of the Electronic Schoredinger Equation on Non Uniform Memory Parallel Processors,* Dr A. Rendell, ARC Linkage Grant, $498K
2003-2006, *Low Cost Photovoltaic Modules through Reduced Silicon Consumption*, Professor A. Blakers, ARC Linkage Grant, $620K
2003-2006, *PhD Scholarship – Renewable Energy*, The Eldon and Anne Foote Trust, Professor A. Blakers, $90K
2003-2007, *Centre for Solar Energy Systems*, ARC Centre of Excellence, Professor A. Blakers, $1.5M

F. MAJ0R PRIZES, HONOURS, AWARDS

Professor Matthew James was awarded an ARC Professorial Fellowship

Dr Shankar Kalyanasundaram was a recipient of the Vice-Chancellor's Award for Teaching Excellence

Professor Brendan Mckay was awarded the Eureka Prize for Critical Thinking from the Australian National Museum

David Excell was awarded a University Medal

Michael Chan Chun Tao was awarded a University Medal

G. BUDGET PERFORMANCE

The Faculty completed the year 2003 with a modest (but planned) operating deficit. A significant carry forward from previous years has allowed us to invest in the delivery of new programs such as the Master of Engineering. Significant increases in international student numbers assisted us to exceed budgetary expectations for 2003.

H. GENDER EQUITY PERFORMANCE

The Faculty continues its efforts to recruit female students. It operates a Women's Network Scheme to enhance the attractiveness to women of programs within the Faculty. The Scheme aims to ensure that the Faculty's programs are conducted in a manner that respects and values women's interests, experience and learning styles. The Scheme also aims to promote engineering and information technology as suitable and fulfilling careers for women.

A key role of the Women's Network is to provide a support mechanism for females studying in the Faculty. Regular lunchtime seminars were held throughout the year, with recent female FEIT graduates invited as key note speakers. Feedback regarding the seminar program has highlighted the positive impact the talks have had on female students. Furthermore students have benefited from the opportunity to build personal networks with fellow female students in other FEIT degree programs.

The Faculty also has a scholarship program for female students. In 2003 Jessica McMahon was awarded the ANUTECH Lisa Bodribb Women in Engineering scholarship while Bianka Malzacher was awarded the Faculty First Year Women's scholarship.

In 2003 there were exactly the same number of female students enrolled in the Faculty's programs as in 2002 – 206. The proportion of female students fell slightly overall due to an increase in total students although in Engineering degrees there was a 14% increase in female students.

I. FUTURE DIRECTIONS

The decline in student interest in Information Technology programs is likely to be a challenge for some years to come, but high demand for IT professionals is predicted in 2006. We would expect some recovery in IT enrolments after that time. To offset this development, the Faculty is diversifying its offerings by increasing the emphasis on Masters programs, consistent with the research emphasis of the University. The Faculty will be offering a new Master of Software Engineering from Session 2 in 2004, as well as a Master of Engineering with Honours to be introduced at the same time. The latter will provide a second year of study for ME graduates that should allow them to seek Permanent Residence in Australia and become eligible for Australian PhD scholarships. Early indications are that this option will be very popular with students. Since it is anticipated that most of these students will be taking their projects in research schools and other faculties, this development should contribute significantly to the anticipated growth in PhD students in the University.

J. INVOLVEMENT IN THE NATIONAL INSTITUTES

The Faculty has continued to actively participate in the National Institutes for Engineering and Information Sciences and Physical Sciences. Professor John Baird formed the ANU Engineering Industry Alliance which links the interests of both National Institutes. Activities in which both were involved included the Careers Night, and the seminars 'The Knowledge Revolution in the ACT' and 'Materials Science and Innovation in the ACT'. A significant number of Faculty staff attended these activities.