9-24-2007

The Information Systems Academic Discipline in New Zealand

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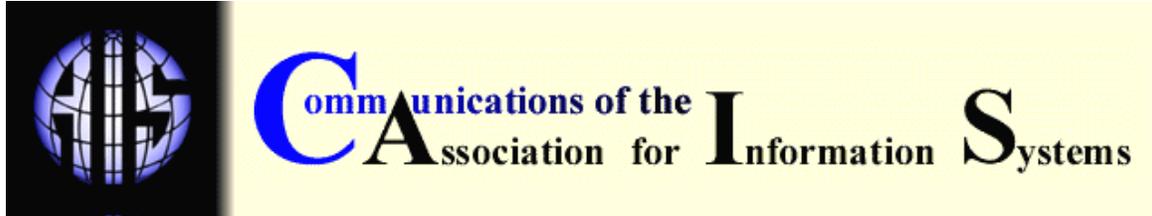
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THE INFORMATION SYSTEMS ACADEMIC DISCIPLINE IN NEW ZEALAND

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ABSTRACT

This paper examines the background and development of academic information systems as a field of teaching and research in universities in New Zealand, from its roots in the late 1970s until the present time. Interviews were held with key informants within the information systems departments in every university in the country, as well as one polytechnic institution which has recently applied for university status. Based on the interview data along with other data drawn from the universities' Web sites and elsewhere, as well as the personal knowledge of the authors, individual case studies of each institution were prepared and validated by the key informants. The paper begins with an overview analysis of the current situation and recent past, with a special emphasis on the student enrolment issue. The information systems discipline is reviewed across the nine institutions through a detailed cross-case analysis including a number of summary tables comparing various statistics across all New Zealand institutions. The cross-case analysis addresses issues such as the role of international students in IS, the comparative location of IS in the various institutions, and the overall "nature" of IS across the country. The results of this study and analysis provide a unique perspective on the past, present, and future of academic information systems in New Zealand.

Keywords: Information Systems, IS discipline, New Zealand universities, case study

I. INTRODUCTION

As with other universities in Australasia and the wider Pacific region, the development of academic programs and research in information systems in New Zealand universities has been a roller-coaster ride during the past decade. Three separate identifiable stages have taken place since the advent of New Zealand universities' IS academic programs and departments in the early mid-1980s. Figure 1 depicts the typical growth pattern. The first was a lengthy period of steady though unspectacular growth. This period began in the early 1980s, and continued until approximately 1997. During this time frame, the initial seeds were sown for academic IS in each of the country's seven universities. While the early growth rates were unspectacular, path dependencies are clearly evident; apparently minor variations in the early formation and development of academic IS have led to very substantial differences in the nature and style of the country's IS programs today.

Student
enrolments

**Typical pattern of student demand
for information systems and
e-commerce programmes in NZ
universities**

Stage 1
Gentle Growth

Stage 2
Dot.com
acceleration

Stage 3
Downturn

Stage 4
???

??

1980   1985   1990   1995   2000   2005
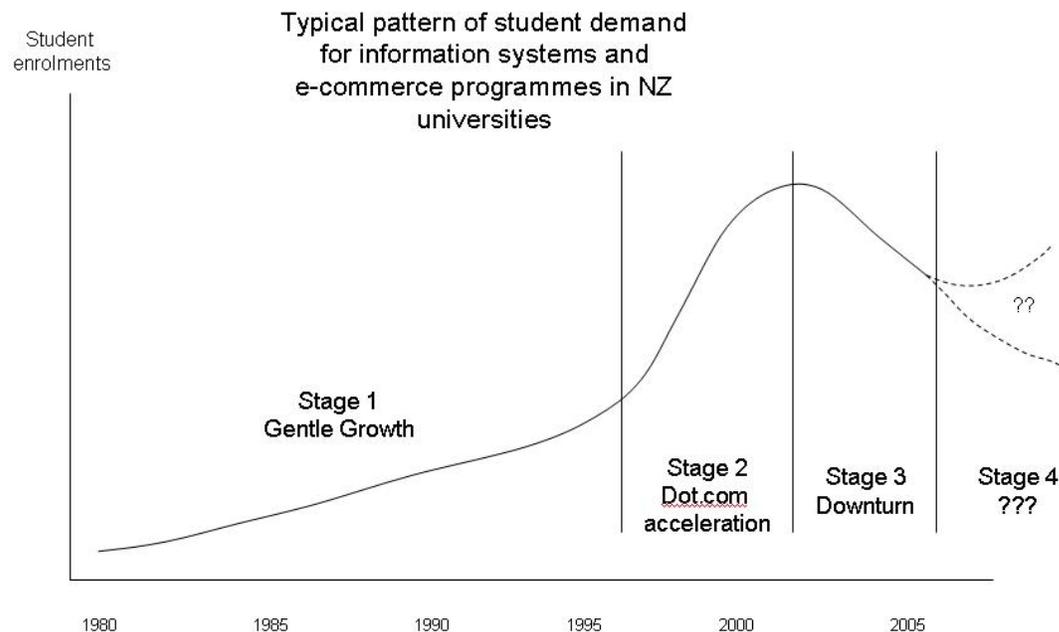
Figure 1. Typical Pattern of Student Demand

The second stage extended from around 1997, through late 2002. This period witnessed a much more rapid rate of growth, both in terms of the number of students seeking an IS education, the size of the IS faculties, and also in breadth of program offerings. At times it seemed like a free-for-all, with each university trying its best to hire new staff (not infrequently from each other), and to mount new programs to take advantage of the growth in student demand. Of course this rapid growth period was not unique to New Zealand, rather, was a worldwide phenomenon at the time. The primary driver of this ramp-up in demand was, of course, the growth of the Internet, and perhaps more importantly, of electronic commerce.

The end of the dot-com boom arrived in mid-2001, and by late 2002 or early 2003, most New Zealand universities were starting to experience a contraction in their student demand for courses, majors, and programs in information systems and/or electronic commerce – marking the third stage. Some were hit harder than others. Waikato University, for instance, claims that it has experienced and been affected by the student downturn very little, if at all, while the University of Auckland has recently been threatened with staff layoffs.   To some extent these apparent differences are a function of the universities' different funding mechanisms. The more directly an IS department or school's budget is derived from student enrolments, or EFTS,[1] the more likely it is to be (painfully) aware of any downturn. So it is possible that universities which suggest that they have not experienced any significant student downturn may in fact just not have noticed, since the impact on their department's budget may have been buffered by their particular funding mechanism. Indeed, in some instances it was reported to us that the downturn was actually welcomed: smaller classes, more time to get on with research. Obviously, such sentiments only emerge from institutions where the impact of the downturn is not sufficiently great so as to put jobs at risk, and where academic staff are sufficiently shielded from the budgetary impacts (e.g., by holding substantial external research grants).

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[1] EFTS = Equivalent Full Time Student. One EFTS is the funding received, from government plus student tuition, for a single full-time student.

New Zealand universities are currently entering Stage 4. The big question on everyone's minds is, what will the fourth stage look like? Will enrolments resume an upward climb? Will they stay flat? Or will the decline continue? And if the latter, what will be the implications for programs, for staffing, for research output, and the like?
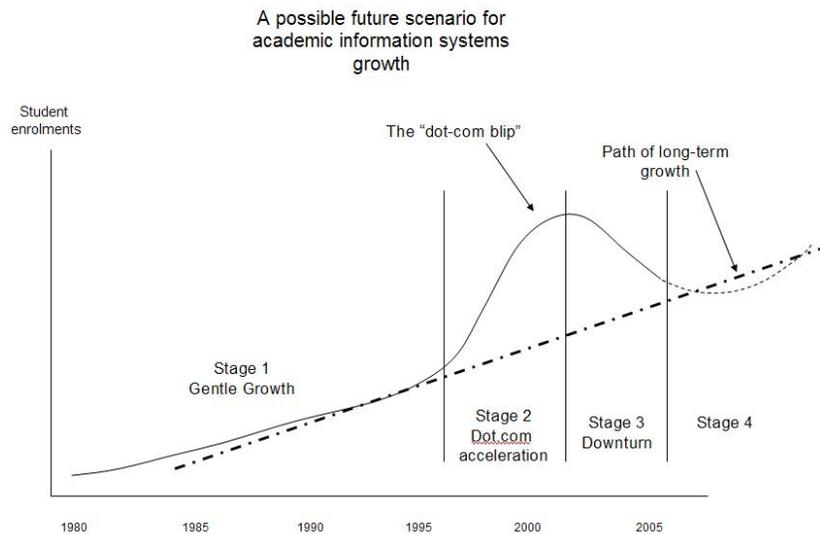

Figure 2. Possible Future Growth

It is also worth noting that, if universities re-engage the growth pattern of the late 1990s, then the period from 2002 through 2005 may in the future be seen not so much as a turning point, but rather more of a hiccup along the road to greater growth and expansion. This possible future scenario is illustrated in Figure 2.

Whether or not this growth path in fact unfolds in the future, along with numerous other topical matters regarding academic information systems in New Zealand will be explored further through the cross-case analysis reported later in this paper.

II. OVERVIEW OF INFORMATION SYSTEMS IN NEW ZEALAND UNIVERSITIES

In the early 1980s, there were just six universities in New Zealand: University of Auckland, Waikato University, Massey University, Victoria University of Wellington, Canterbury University, and Otago University.   A seventh was added in 1990 – Lincoln University, originally an agricultural college. An eighth, Auckland University of Technology, was originally a polytech, but applied to the New Zealand government to be upgraded to university status, and became a university in 2000. Unitec is an Auckland-based polytech which also has aspirations to become a university, but the New Zealand government has (so far) declined to allow it to do so. Figure 3 indicates the geographical location of the eight current New Zealand universities.

Massey University has three separate campuses – one in Palmerston North (the original campus), one in Albany (just north of Auckland) and the third, most recent campus in Wellington. The University of Auckland has two campuses, both in Auckland. Victoria University has three separate campuses, all in Wellington.   All the other universities have single campus arrangements.
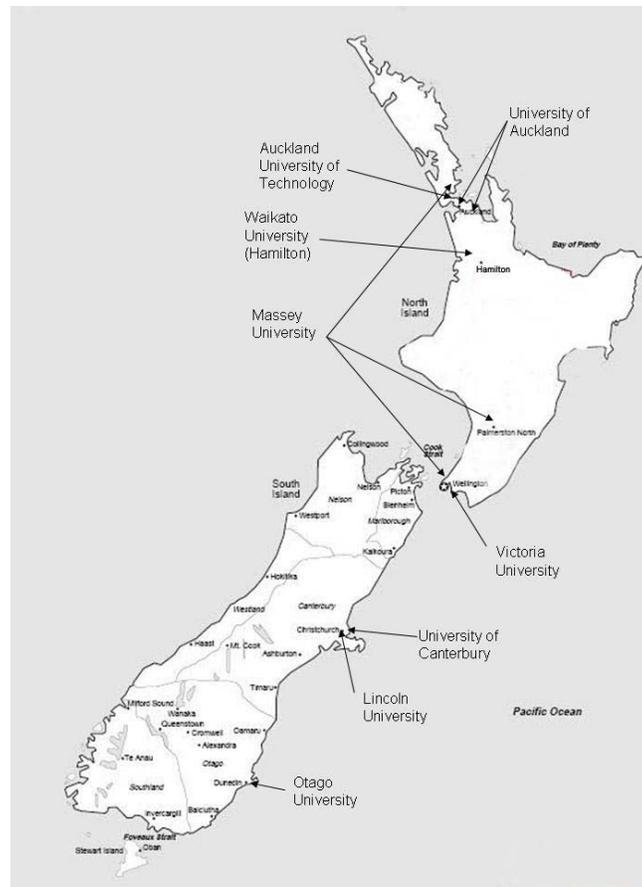
Figure 3. University Locations

Each of the eight New Zealand universities offers educational programs and conducts research in the general area termed information systems, although there are quite wide differences between the different institutions.

The most notable differences centre on:

- Organizational location of the information systems staff and programs;
- The extent to which the research interests and teaching emphases are more technical, versus more managerial/organizational;
- Size of the staff;
- Research intensity of the staff;
- Research foci of the staff; and
- Number of different programs offered (undergraduate, honours, masters, PhD, post-experience, contributions to other programs such as MBA, and so forth).

Table 1 following provides a variety of demographic and structural details regarding the New Zealand universities.

III. RESEARCH METHOD

For the purposes of this study, data were gathered from all eight New Zealand universities, plus Unitec. Individual case studies were conducted, using in-depth semi-structured interviews combined with information taken from each university's Web site. Most interviews were conducted face-to-face, while a small number were done via telephone. One or two key

informants – typically the head of the department, or a senior, long-time academic in the department - at each institution served as the interview subjects. The interview subjects were initially contacted by the researchers by e-mail, agreement for the interviews obtained, and a date for the initial interview established.   Most interviews required between 2.5 and 3 hours to complete.   The interviews were recorded and transcribed, and checked for accuracy by the original interview subjects. Table 2 indicates the names and institutions of all of the informants who provided comments and data for the study.

Table 1. IS Programs in New Zealand Universities

University	Uni (*) #Students	IS Unit #1st Year	#total	PostGraduates Master etc	PhD	#Staff	Student/Staff ratio
University of Auckland (**)	40,176	2,000	3,850	17	18	45	86
Auckland University of Technology	21,677		900	78	36	42	12
University of Waikato	14,292	800	300	20	8	14	21
Massey University (all campuses)	40,115	2,000	600			55	11
Massey: Palmerston North and Wellington (***)	35,529	1,000	350			40	9
Massey: Auckland	4,586	1,000	250	25	7	15	17
Victoria University of Wellington(**)	20,743	1,000	350	20	25	23	15
University of Canterbury	13,428	500	500	0	2	10	50
Lincoln University	4,346	300	100	4	3	12	8
University of Otago	19,717	750	1,500	13	18	31	48
Unitec New Zealand (****)	15,165	n/a	1,500		11	47	32

(*)Ministry of Education census for the full year 2004

(**) includes the respective Colleges of Education, which merged in 2005

(***) Massey has a large contingent (over 40% of their EFTSs) of distance students

(****) Degree issuing polytech, but under application for university status

In summarizing the data gathered from each New Zealand university, for ease of cross-comparison, the same organizational structure was used for each, as follows:

- Origins
- Current situation
- Student enrolments
- International students and distance education
- Teaching issues
- Research issues
- Summary comments

Table 2. Key Informants

University	Key informant	Name of Unit	Reports to
University of Auckland	Ananth Srinivasan	Department of Information Systems and Operations Management	Auckland Business School
Auckland University of Technology	Tony Clear Felix Tan	School of Computing and Information Sciences	Faculty of Creative and Design Technologies
Waikato University	Robert McQueen Sally-Jo Cunningham	Department of Management Systems	School of Management Studies
Massey University	Chris Freyberg Dennis Viehland	Department of Information Systems (Palmerston North and Wellington); Information Systems Group (Albany)	College of Business; Institute of Information and Mathematical Sciences
Victoria University of Wellington	Ivan Jackson	School of Information Management	Informatics Group
University of Canterbury	Bevan Clarke Paul Cragg	Information Systems Group	Department of Accounting, Finance and Information Systems
Lincoln University	Alan McKinnon	Applied Computing Group	Division of Environment, Society and Design
Otago University	George Benwell	School of Information Science	Faculty of Commerce/School of Business
Unitec	Alison Young	School of Computing and Information Technology	Vice-chancellor

The next section discusses the results of the comparative analysis across all New Zealand universities covered in this investigation. The study concludes with a summary profile of information systems research in New Zealand and some proposals regarding the maturity of the IS discipline in New Zealand universities.

IV. COMPARATIVE ANALYSIS OF IS IN NEW ZEALAND UNIVERSITIES

THE UNIVERSITIES IN NEW ZEALAND[2]

Auckland, with some 40,000 students, is the largest tertiary institution in the country by far and offers the widest set of academic programs. Massey has a similar overall student population and is New Zealand's foremost tertiary distance education provider with some 16,000 distance education students. With a resident student population of some 24,000, Massey, however, leads the group of New Zealand's mid-sized, traditional universities with around 20,000 students each. Victoria in Wellington and Otago in Dunedin are further joined by AUT, the newest large university. Waikato and Canterbury, both under 15,000 students, are the core of the smaller NZ

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[2] In the following paragraphs, Unitec, which has applied for, and is likely to be granted, university status, will be counted among the 'universities.'

universities. Lincoln, as a specialist, agri-technology focused boutique-university, is the smallest tertiary institution in the land. Unitec, on the other hand, once its university status is confirmed, will lead this group with more than 15,000 students.

NZ universities have a substantial number of foreign students, mainly Asian, and mostly from China. On average they make up just one-sixth of the student population; however, Lincoln – as a specialist institution with a world-wide reputation - has a much more substantial foreign student population: nearly half of the students come from outside New Zealand.
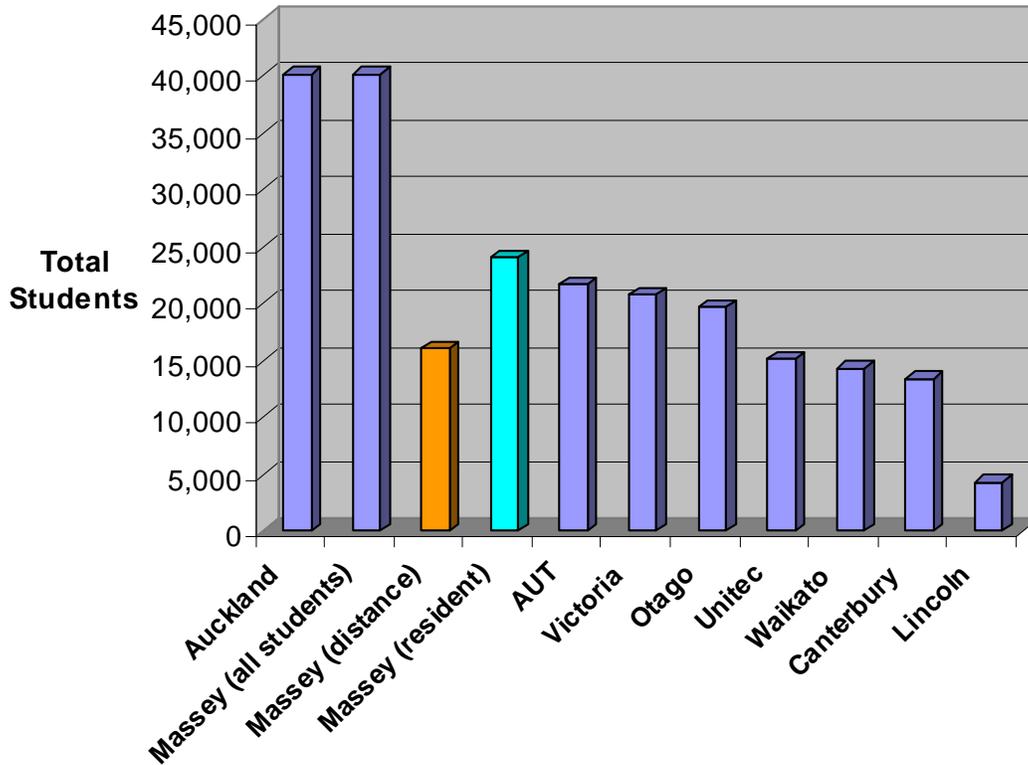
Figure 4. New Zealand Universities by Student Numbers

However, the official numbers only tell half the story. It is possible in New Zealand to obtain permanent residence status by depositing a sum of money in the country. Many foreign students take this opportunity, make the deposit in form of a mortgage on a house and thus become resident in the country and as such are counted among the other local students.

Within the IS discipline, the number of students who have English as a second language (ESL) is often very high: In the last year of the bachelor degrees the respondents' estimates for ESL students rank as high as four-fifths of the average class in Auckland and Lincoln. It is only at Victoria, Christchurch, and Otago that ESL students constitute substantially less than half of the class. The implications of this situation for the quality and extent of teaching and learning were characterised as "very significant."
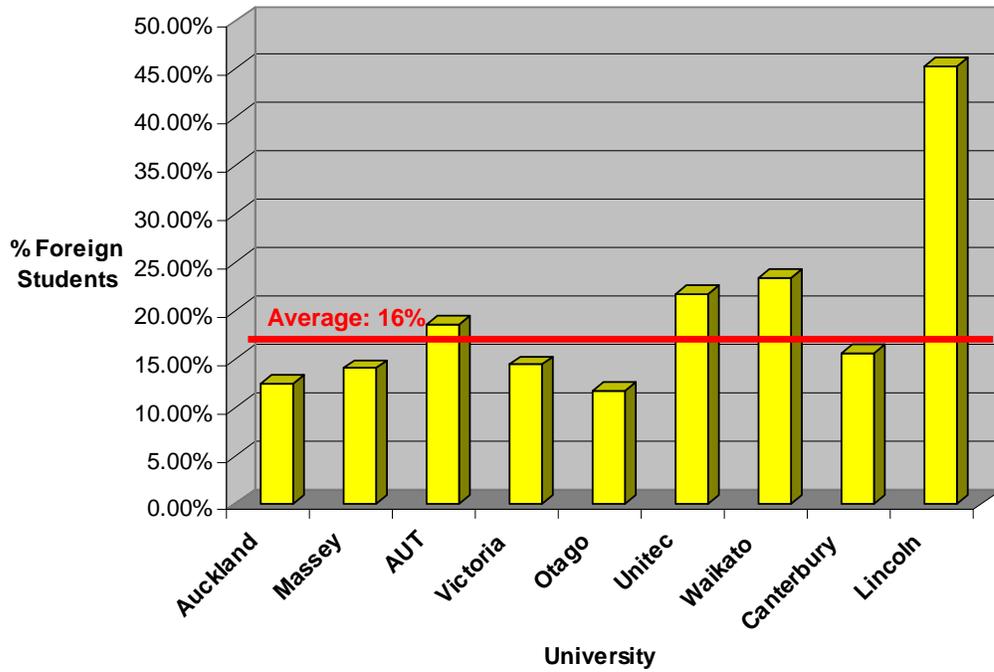
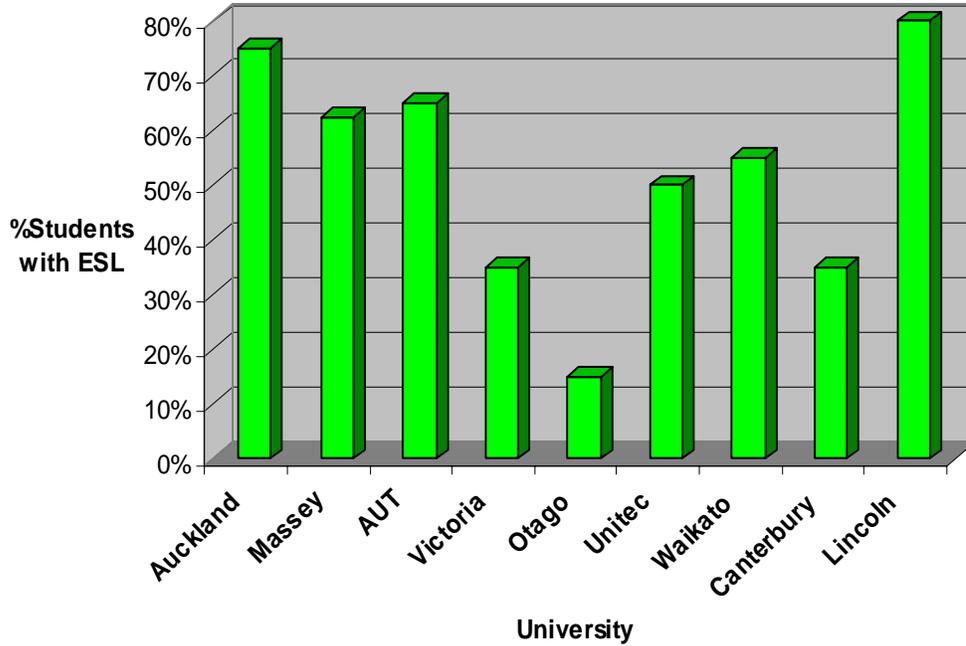Figure 5. Proportion of Foreign Students – Universities Total

Figure 6. Proportion of ESL Students in IS

IS UNITS IN NZ UNIVERSITIES

An overview of the IAS units in New Zealand universities is provided in Table 3.

Table 3. Overview of the IS Units in NZ Universities

University	Staff	Name of IS Unit	Organizational Place reports to/part of	reports to/part of
University of Auckland	45	Department of Information Systems and Operations Management	Auckland Business School	
Auckland University of Technology	42	School of Computing and Information Sciences	Faculty of Creative and Design Technologies	
University of Waikato	14	Department of Management Systems	School of Management Studies	
Massey (Auckland)	15	Information Systems Group	Institute of Information and Mathematical Sciences	College of Sciences
Massey (Palmerston North & Wellington)	40	Department of Information Systems	College of Business	
Victoria University of Wellington	23	School of Information Management	Informatics Group[*]	
University of Canterbury	10	Information Systems Group	Department of Accounting, Finance and Information Systems	College of Business and Economics
Lincoln University	12	Applied Computing Group	Division of Environment, Society and Design	
University of Otago	48	School of Information Science	Faculty of Commerce/School of Business	
Unitec New Zealand	32	School of Computing and Information Technology	(Vice Chancellor)	

(*) Until 1 November 2006, when it became part of the Faculty of Commerce and Administration

The organizational placement of the various IS units is quite homogenous. With the exception of Unitec, where the School of Computing and Information Technology reports directly to the vice chancellor, all other schools are located as sub-units within faculties. However, Canterbury as well as Massey in Auckland are placed one level below, i.e., report to units within faculties, and are thus three layers removed from the VC.

The majority of IS units report into commerce/business faculties. At the time of investigation there were four exceptions:

1. AUT, where they are part of a newly created Faculty of Creative and Design Technologies;
2. Massey in Auckland, who are part of the College of Science;
3. Lincoln, where the unit reports into the Division of Environment, Society and Design; and

4. Victoria in Wellington, which until November 2006 was part of an "Informatics Group" (then together with the School of Mathematical and Computer Sciences, the IT support group and the Library), but has now returned to the Faculty of Commerce and Administration.

Staff numbers in the units range from 47 faculty at Unitec to 10 at Canterbury. They seem to be roughly aligned with the number of IS students.[3] However, there seems to be lower staff/student ratios in the institutions that have a more practical orientation. Conversely, the seniority profile of faculty is different, too. For example, the 47 staff members in Otago have a very high proportion of junior tutors and instructors.
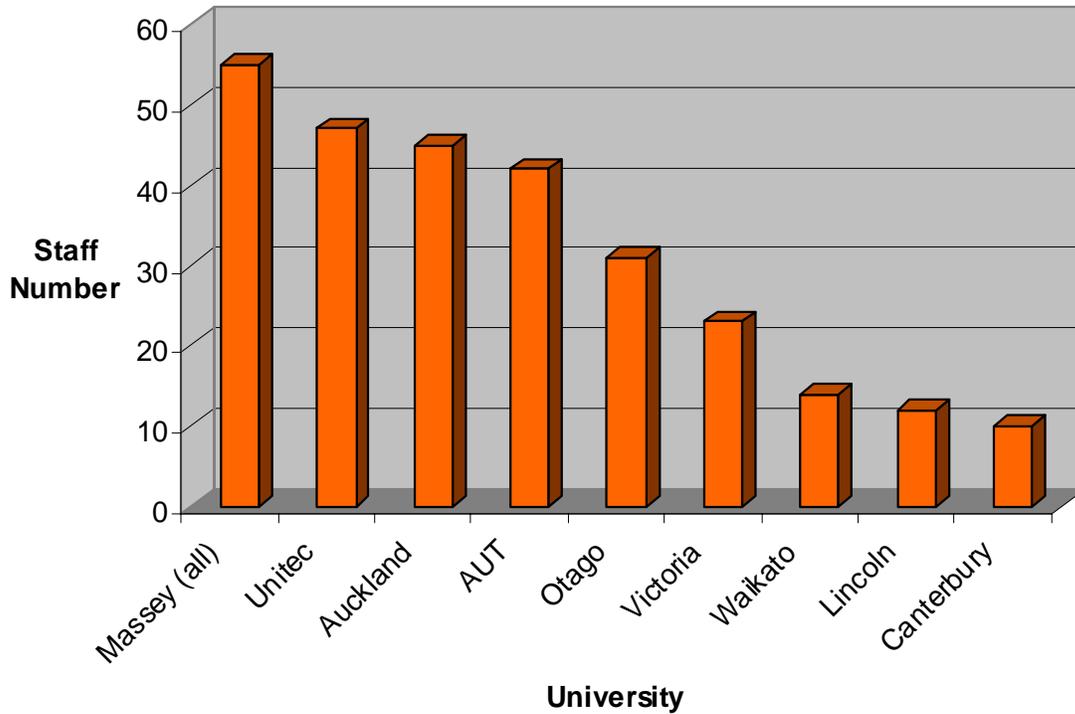
Figure 7. Staff Numbers in IS Units

All IS units have a postgraduate program – but with widely different emphasis. Interestingly, the extent of postgraduate research work is not at all aligned to the overall number of students. There is a distinct variation in the teaching and research focus between the IS programs in NZ universities.

The extraordinary high number of postgraduates in AUT relates to the great diversity of degree programs across the related disciplines unified in their School of Computing and Information Sciences and the perceived need to change the institution from a teaching polytech into a research-led university.

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[3] The student numbers reported are very approximate; because of universal weaknesses in the administrative statistics it was very difficult for the participants to provide accurate numbers for students and/or EFTSs and the resulting estimates vary wildly in plausibility.

Victoria has the strongest focus on postgraduate research and especially leads the traditional universities with the largest number of PhD students.[4] Auckland has the second-highest number of postgraduates. Unitec's overall number would be higher, but at the time of the investigation, its masters program was still under development. Massey in Palmerston North and Wellington could not provide us with numbers of postgraduate students, but it can be estimated that they would be substantial, too.
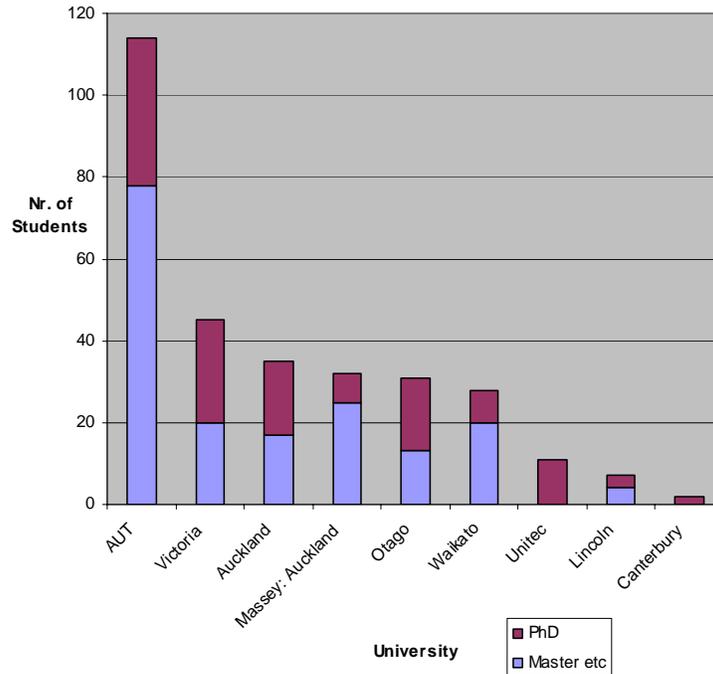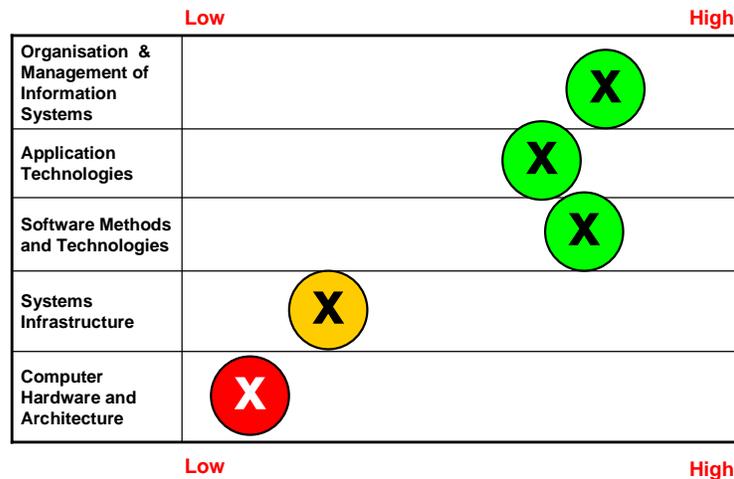

Figure 8. IS Postgraduate Students

THE "NATURE" OF IS PROGRAMS IN NEW ZEALAND

The characteristics of the IS offerings of the IS units within the universities were expressed as the extent to which the research interests and teaching emphases are more on technical, versus more on managerial/organizational issues. This was achieved by the respondents assessing whether the emphasis in their respective programs was "low" or "high" for each of the elements of the *Problem Space of Computing* (following the ACM Computing Curriculum 2005).

The mean across all universities follows quite closely the traditional definition of IS as the business application of computing. The mean across all universities showed that the strongest emphasis is given to the managerial and organizational issues of information technology in business. Furthermore, most institutions have a strong focus on application development and some also emphasise the related software technologies. Across all universities, however, the more "pure" technical subjects of hardware infrastructure and architecture are not in the foreground of teaching and research.
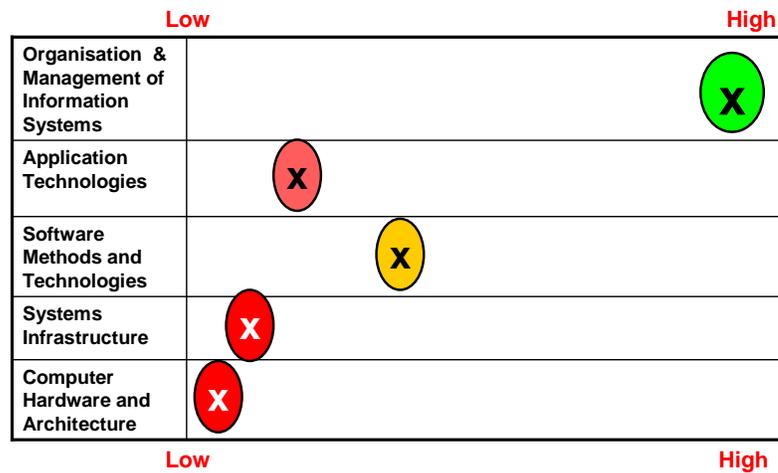
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[4] This is one consequence of a strong research culture in Victoria's IS unit, which is also reflected in their highest PBRF score among all NZ IS units.

	Low		High
Organisation & Management of Information Systems			**X** (green)
Application Technologies		**X** (green)	
Software Methods and Technologies			**X** (green)
Systems Infrastructure	**X** (yellow)		
Computer Hardware and Architecture	**X** (red)		

Low   High

(*) Expressed as a profile within the "Problem Space of Computing", ACM Computing Curriculum 2005

Figure 9. Nature of IS Teaching and Research at All NZ Universities

However, the mean values hide strong differences between individual universities. The Canterbury IS unit concentrates mostly on the business end of IS and leaves the technical aspects largely to a strong computer science group at the same university.

	Low		High
Organisation & Management of Information Systems			**X** (green)
Application Technologies	**X** (pink)		
Software Methods and Technologies		**X** (yellow)	
Systems Infrastructure	**X** (red)		
Computer Hardware and Architecture	**X** (red)		

Low   High

(*) Expressed as a profile within the "Problem Space of Computing", ACM Computing Curriculum 2005

Figure 10. Nature of IS Teaching and Research at Canterbury University

At the other extreme is a group of more technically oriented IS units, comprising of Otago (shown following as an example for all three), Lincoln (which has a clear focus on "applied computing" only) and Unitec. AUT, as a former polytech has historically had the same practical orientation as Unitec, but since becoming a university has increasingly balanced this with a strong emphasis on the organizational nature of IS. Massey in Auckland, albeit with a clear dominance on business/managerial IS aspects has nevertheless also a strong application technology and

systems methods program – in some accordance with its placement in a science department. the IS programs at Auckland, Victoria, and Waikato all have their central focus clearly on IS as an organizational/business discipline, without, however, neglecting its more technical aspects, predominantly in the application technology area.
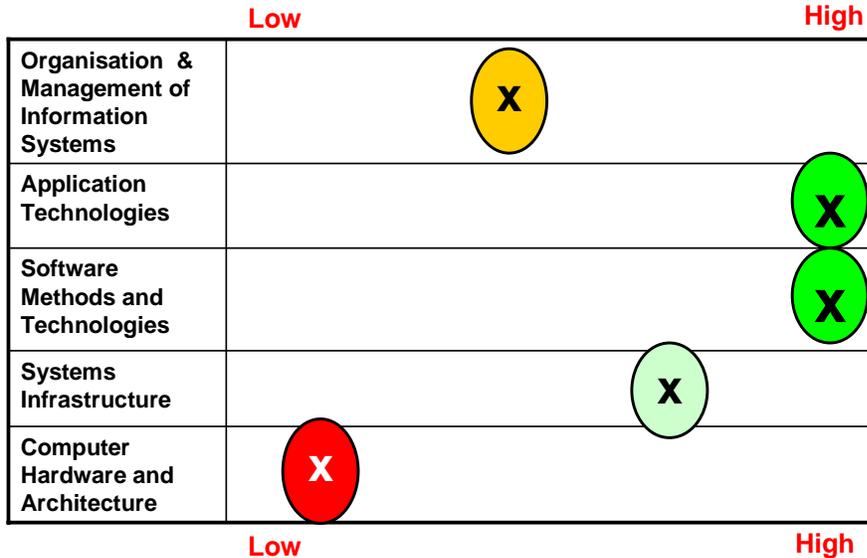
	Low		**High**
Organisation & Management of Information Systems		X	
Application Technologies			X
Software Methods and Technologies			X
Systems Infrastructure		X	
Computer Hardware and Architecture	X		
	Low		**High**

(*) Expressed as a profile within the "Problem Space of Computing", ACM Computing Curriculum 2005

Figure 11. Nature of IS Teaching and Research at Otago University

V. CONCLUSIONS

Information Systems is an amalgam of technical information technology elements anchored in an organizational and managerial enterprise context. As such it is distinct from computer science and systems engineering. Its hybrid nature, however, means that there are overlapping elements between the three disciplines.

In terms of its offerings, the IS discipline in New Zealand gravitates more towards a firm emphasis on the organizational/managerial business aspects of information technology. However, three IS units (at Unitec, Otago, and Lincoln) see their central focus squarely in the application technology/systems engineering area and two (AUT and Massey in Auckland) balance a business with a technical approach. For that reason it seems fair to say that IS in New Zealand, despite its clear business orientation, does have a significant bias towards the more technical elements of the discipline, especially a pronounced overlap with systems engineering.
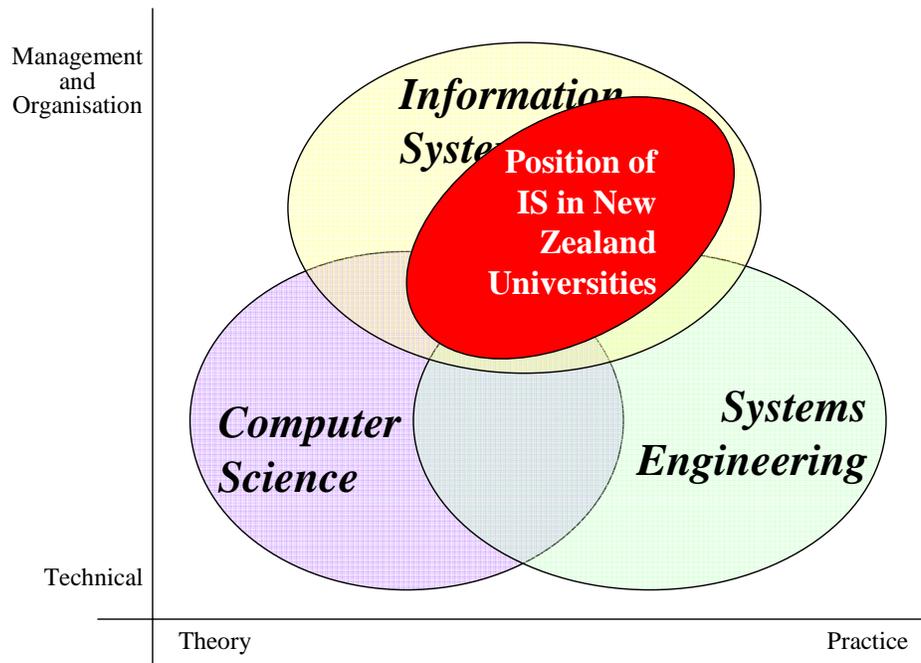
Figure 12. Position of IS in New Zealand Universities

The discipline profits to some extent from the smallness of New Zealand and the close connections between universities. However, it is true to say that most IS academics in New Zealand would identify more with their international peer group than with their local colleagues. On the other hand, there are local research and teaching groupings, e.g. for research into mobile information technology and for teaching (and also research) into electronic commerce. The requirement that every postgraduate degree must have one external examiner based in New Zealand also contributes towards a more commonly understood and accepted standard for information systems research. But, whilst these initiatives might lower the impact of local contingencies somewhat and, conversely increase the degree of professionalism in the local IS community (in the terms of Ridley's, 2006 framework) the character of the New Zealand IS discipline itself still remains a "fragmented adhocracy" in Whitley's [1984a] terms.

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APPENDIX I. THE OVERARCHING STUDY:
THE STATE OF THE INFORMATION SYSTEMS ACADEMIC DISCIPLINE IN PACIFIC ASIA

Figure A-1 depicts the main components of the study "The State of the Information Systems Academic Discipline in Pacific Asia." The Pacific Asia study is motivated from a recognition that Information Systems as an academic discipline has evolved differently around the world. The genesis of the study was a panel of the 6th Pacific Asia Conference on Information Systems (PACIS'02), Tokyo, Japan, ultimately resulting in formal project commencement in 2004 with AIS endorsement and seed funding.

Principal of the several related sub-studies is a series of case studies across the states[5] of Pacific Asia. The overall study has from the outset been designed and executed with the expectation that it would be extended and repeated over time. It was decided early on to restrict the first iteration of the study to those areas in the region where IS is relatively more visible internationally – Australia, Hong Kong (China), Korea, New Zealand, Singapore, and Taiwan.

Shaded ovals in Figure A-1 represent those components completed in the first execution, with results reported in this special issue of CAIS. Unshaded ovals represent components in progress (i.e. Mainland China Case Study), and dashed ovals represent components soon to commence.

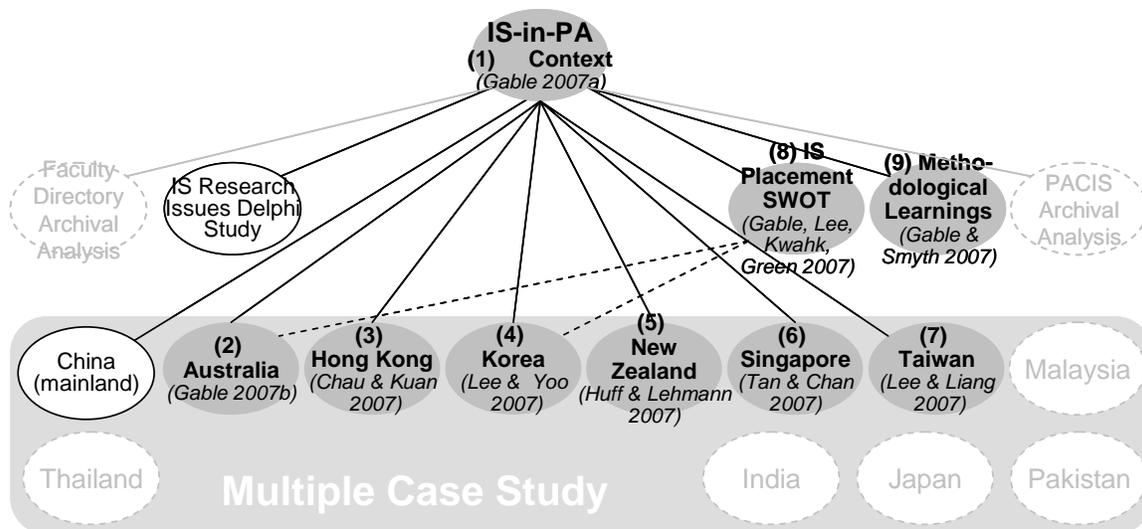[5] The term "state" is used to refer to each of the national entities studied.

Figure A-1. The IS in Pacific Asia Region Sub-Studies

The largely exploratory and descriptive state case studies employed a common research framework [Ridley 2006]. The framework considers the current and past state of IS in Pacific Asia universities from the perspective of the development of a discipline. The framework was guided by Whitley's Theory of Scientific Change [1984a 1984b]. It suggests that there is an inverse relationship between the impact of local contingencies and a discipline's degree of professionalism and maturity.

Given the descriptive and exploratory character of the overall study, the team harboured no illusions regarding the ultimate completeness of issues to be identified, related evidence to be gathered, and analyses to be conducted. It was acknowledged that the study offers a mere starting point for ongoing monitoring of the state of IS in the Pacific Asia region. Regardless, efforts were made to achieve some level of representativeness of the evidence and perspectives reported: (1) Selection of the study team – sought region-wide representation. This suggested state-based case reports. Senior and well known IS academics were approached. (2) Interviewees received an early draft of the state report in which their views were recounted. On the basis of feedback, changes were implemented by the state teams. (3) Selected "within state" local experts were sent a copy of the draft state report for review, aims being to: minimize potential adverse reaction from perceived misrepresentation, try to ensure the report is as representative of the state as possible, enrich the report with further insights, and ensure the process of peer-review results in papers of strong academic standard. (4) All authors on all papers of the special issue reviewed the complete draft special issue.

ABOUT THE AUTHORS

Sid Huff is Professor of Information Systems and head of the School of Information Management at Victoria University of Wellington, New Zealand. His research focuses on IS strategy, IT governance, senior management roles in IT, and electronic commerce. He has published extensively in both academic and practitioner journals, and has also written over 50 teaching cases for educational use. He is the lead author of *Cases in Electronic Commerce*, the second edition of which was recently published by Irwin/McGraw-Hill. His most recent book was *Managing IT Professionals in the Internet Age,* co-authored with Dr. Pak Yoong. He holds degrees in Applied Mathematics, Electrical Engineering and in Business Administration, from Queens University. He received his Ph.D. in Information Systems from the M.I.T. Sloan School of Management.

Hans Lehmann is the associate professor for Electronic Business at Victoria University of Wellington, New Zealand. His 35 years of business experience with information technology, both in line management and as a consultant with Deloitte's, span continental Europe, Africa, the United Kingdom, North America and Australasia. In 1991, Hans changed careers and joined the University of Auckland, New Zealand, where he focused his research on the strategic management of global information technology. In 2003 Hans moved to Victoria University where his current research interest is in the application of wireless technology in business. He has well over 100 refereed publications to his name and has spoken at numerous international conferences. Hans is a graduate in psychology from the University of Vienna and the University of Natal, and in business administration from the University of South Africa. His PhD in Information Systems was obtained from the University of Auckland.