

4. The information systems discipline in Australia's capital

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Abstract

The Australian Capital Territory (ACT) is the seat of Australia's federal government. The three universities studied—the University of New South Wales at the Australian Defence Force Academy (UNSW@ADFA), The Australian National University (ANU) and the University of Canberra (UC)—are all located in the nation's capital city, Canberra. Each group has a distinctive background that reflects this setting. The UNSW@ADFA is essentially a private university for the Australian Defence Organisation; the ANU was set up to be a national research institution; and the UC group for many years focused on meeting the training needs for computing professionals for the federal government. Despite these distinguishing characteristics, the information systems (IS) groups studied have some commonalities. Pedagogical approaches, epistemological approaches and research topics are all recognisably within the bounds of what is regarded as legitimate for the IS discipline. There is also a degree of commonality in the core knowledge topics offered to students. There are, however, also aspects that detract from the degree to which IS has developed as a discipline. Our field is not regarded as socially prestigious and there are few signs of mechanisms of control. A unique symbol set does not exist to exclude outsiders. The placement of the organisational units within the universities is a result of local contingencies, as is, to some extent, the nature of research undertaken.



Figure 4.1 Location of the Australian Capital Territory within Australia

Introduction

A study of the state of the IS discipline in the Australian Capital Territory could be expected to show some distinctive characteristics, as all universities are relatively small and are situated in Australia's national capital, Canberra, which is the home of the federal government. With this proximity to government and national institutions it would perhaps not be surprising to find the impact of local contingencies stronger than in other states.

In this chapter, we present our analysis of IS in three universities in the Australian Capital Territory, allowing for a comparison with other states in an accompanying chapter in this volume. The aim of the ACT study is to document commonalities and differences across the three universities in terms of teaching and research, to identify significant influences on the discipline and to consider emerging trends. The chapter concludes with an assessment of the degree of professionalism exhibited in the IS discipline across the ACT universities, based on a modified form of Ridley's (2006) framework.

It should be noted that the Australian Capital Territory differs from the Australian states in that it is a 'territory' rather than a state—a distinction shared also by the Northern Territory. The Australian Capital Territory was chosen as the seat of the Australian government and the home for Canberra in 1908. A neutral location for the capital and the new territory was selected between Sydney and Melbourne, because of the rivalries among the states that federated to form the nation of Australia in 1901. The territory covers just 2538 square kilometres and is tiny compared with the large state of New South Wales that surrounds it. The population of the Australian Capital Territory is approximately 300,000 and almost all its inhabitants live in Canberra, which is home to the three university institutions described in this report. The descriptions of the institutions should be read against this common background of being situated in a relatively new,

planned, government city with a smaller population than all but one of the capital cities in the other states in Australia.

The three institutions represented are The Australian National University (ANU), the University of Canberra (UC) and the University College of the University of New South Wales (UNSW) at the Australian Defence Force Academy (UNSW@ADFA). The Australian Capital Territory also has campuses of the Australian Catholic University and Charles Sturt University but, as they do not have IS programs, they are not included.

The research method

The ACT study uses the case-study method, following Yin (2003). A detailed case-study protocol was employed, provided by the Queensland team. A research assistant, Ahmed Imran, interviewed each of the authors separately as an initial source of information, with each interview taking approximately one hour. The interview data were supplemented by archival research. The report was then extended and refined by additions from each of the authors and colleagues at the three institutions.

Each of the three authors of the report represented one of the institutions included and we were able to collaborate face to face in preparing the report as we were all located within such a small geographical area. The authors are used to working together and interacting around common interests on other occasions. It is acknowledged that what we have chosen to highlight in the concluding analysis of our case studies reflects our own experiences and personal insights. We have, however, passed draft versions of the chapter to our colleagues in our own departments and asked them to check our interpretation of our situation. This process resulted in some minor amendments.

The theoretical framework guiding the study

In common with the other chapters in this volume, our chapter utilised the framework proposed by Ridley (2006) for assessing the development of a discipline. This framework draws on Whitley's theory of scientific change (1984a, 1984b) and Fitzgerald's views (2003) on the different knowledge types in a discipline. Ridley's framework is relatively new and its use in the series of case studies in this monograph provides a means of assessing its applicability and for suggestions for potential refinement. We discovered in using the framework to analyse our own cases that some minor modification to the framework allowed our data to be better represented and we have used this revised framework.

The original work by Whitley (1984b) saw some sciences as highly professional, with high task certainty, routinisation of activities and division of labour. Where a discipline was not highly professional, local contingencies had more influence—for example, with the impact of local political pressure. Further,

Whitley (1984b) suggested that three conditions underlay the establishment of distinct scientific fields, namely:

1. scientific reputations become socially prestigious and are used to control 'critical rewards'
2. standards of research competence and skills are established
3. a unique symbol system allows exclusion of outsiders and clear communication between initiates within the field.

Further input to the original Ridley framework (2006) came from the work of Fitzgerald (2003), who characterised the 'body of knowledge' in the disciplinary units as being of different knowledge types:

1. rules or laws (as in the natural sciences)
2. evidenced guidelines
3. normative guidelines.

Table 4.1 shows the adapted Ridley framework as we have used it in this study. Note that although this revised framework is presented at the outset of our chapter, it arose during the course of our data analysis, where we adapted the labels and definition for the categories as a result of insights gained in studying our data—a process in keeping with the grounded-theory approach (Glaser and Strauss 1967).

The term 'knowledge base' was used as an overarching term for the category that included a number of elements relating to a knowledge base, including teaching methods. The term 'core body of knowledge' was not felt to be appropriate for the overarching construct as this term was reserved commonly for the core 'topics' or 'domain' of a discipline, as in the 'core body of knowledge' defined by the Australian Computer Society (ACS) (Underwood 1997)—that is, for element (d) within the overarching knowledge base construct (Table 4.1). Within the knowledge base construct, pedagogical approaches were separated from epistemological approaches, as our data analysis indicated that these were distinct sub-categories.

We have used this framework in our analysis, although we do not necessarily endorse the use of the words 'science' or 'scientific' to describe the IS discipline. This is not to say that IS research should not be rigorous, but the word science has many connotations and at least some of the work done in IS does not conform to common understandings of what makes a science, in terms of the natural and behavioural sciences (for example, see Nagel 1979).

Table 4.1 Framework for analysis of the IS discipline in ACT universities

Framework component	Definition
Mechanisms of control	Scientific reputations become socially prestigious and are used to control 'critical rewards' (Whitley 1984b).
Knowledge base	
a) Recognised pedagogical approaches	There is a common understanding of the methods needed to impart knowledge, whether experiential, laboratory, didactic and so on.
b) Recognised epistemological approaches	Established standards for research competence and skills exist (Whitley 1984b). There is some agreement on epistemological questions as they relate to the discipline. How is theory constructed? How can scientific knowledge be acquired? How is theory tested? What research methods can be used? What criteria are applied to judge the soundness and rigour of research methods (Gregor 2006)?
c) Unique symbol set	A unique symbol system allows exclusion of outsiders and clear communication between initiates within the field (Whitley 1984b).
d) Agreement on core knowledge domain topics	There is some agreement on the phenomena of interest in the discipline, the core problems or topics of interest and the boundaries of the discipline. As an example, Benbasat and Zmud (2003) proposed a core set of phenomena to define the IS field. See also Underwood (1997).
e) Range of knowledge types	A range of knowledge types are present: laws, rules and evidenced guidelines (theory) (Fitzgerald 2003).
Impact of local contingencies	The degree to which local conditions in regions, communities or nations influence the manner in which the discipline operates and is understood (Whitley 1984b).
Degree of professionalism	The extent of variation in the nature of IS research. The degree to which there is task certainty, routinisation of activities and division of labour (Whitley 1984b).

The universities in this study

Table 4.2 presents some summary statistics for the universities in this study.

Table 4.2 Demographics for the home universities for the IS groups, as of 2006

University	Number of full-time equivalent students	Approximate number of full-time equivalent staff (academic and general)
UNSW@ADFA	2 109 (988 u/g) ^a in 2006	300
ANU	> 13 920 (8731 u/g)	> 3 600
UC	6 000 (4 200 u/g)	> 1 000

^a u/g = undergraduate

The academic component of ADFA is the University College of UNSW, which has the status of a faculty. The UNSW has an agreement with the Department of Defence to provide tertiary education to officer cadets and midshipmen of the armed forces of Australia, New Zealand, Singapore and Thailand. In effect, it is a private university for the Australian Defence Organisation; however, it also offers postgraduate education to any qualified applicant, not necessarily with any defence affiliation.

The ANU differs from other contemporary Australian universities in that it was established by an act of federal parliament. On its establishment in 1946, it was given no undergraduate teaching responsibilities. Its mandate was to undertake 'postgraduate research and study both generally and in relation to subjects of

national importance’ (ANU 2005a, 2005b). Undergraduate teaching was gained only when the ANU joined with the Canberra University College in 1960. The Canberra University College had been in existence for some time as a college of the University of Melbourne. The ANU continues to be one of Australia’s most research-intensive universities, with a high ratio of academic staff to students. The ANU was also given an unusual structure, with an Institute of Advanced Studies, which is engaged primarily in research, and ‘the faculties’, which undertake undergraduate teaching as well as engaging in postgraduate training and research. Information systems is situated in the faculties. The university structure has changed recently, with colleges formed in January 2006 that integrate more closely the component parts of the institute and the faculties.

The UC was formed by an act of the ACT government in 1990 from the Canberra College of Advanced Education (CCAEC), which was established in 1969. As a college of advanced education (CAEC), its educational programs focused on professional and para-professional disciplines. As a university, it has increased its focus on research.

Overview of the IS presence in the ACT universities

Table 4.3 gives an overview of the IS groups in the three universities.

Table 4.3 Demographics for the IS groups, as of 2006

University	Administrative entity	Home faculty	Number of full-time IS academics	Number of IS students ^a
UNSW@ADFA	IS Group in School of Information Technology and Electrical Engineering	University College	7.5 (2 vacant)	100
ANU	IS Group in School of Accounting and Business Information Systems	Economics and Commerce	6.5	100
UC	IS Group in School of Information Sciences and Engineering	Business, Law and Information Sciences	11	250

^a Approximate numbers of full-time equivalent students in IS courses, including service courses, not IS programs alone.

ADFA

Computer science was taught at the Royal Military College (RMC) Duntroon for some time. Initially, it was presented by the Department of Mathematics but a separate Department of Computer Science, under Vance Gledhill, was in place in the mid-1980s. While still at RMC, the department introduced a first-year IS subject in 1985. In 1986, ADFA opened and the university moved to it from RMC. The UNSW@ADFA has provided education in IS since its inception in 1986, within the School of Computer Science. For each year since 1986, another

year has been added to the IS curriculum, with an Honours year established in 1991. The first postgraduate research student also started in 1991.

In 1990, there were 120 students in IS first year, with 50 in second year. At that time, the defence force was encouraging students to undertake IS or computer science studies to at least second year. This 'encouragement' has dropped off since then and the numbers fell to about 30 in IS first year in 2003. The numbers have since risen in all years, despite the dip in enrolment in other institutions—to about 65 in first year and 30 in second year.

In 2003, the schools at the UNSW@ADFA were amalgamated and IS is now taught within the School of Information Technology and Electrical Engineering. The IS staff members also provide a service course to the second-year students in the School of Business (about 25 students).

Postgraduate enrolments have been the main increase in student numbers. These numbers have been increasing in the past four years. Currently, there are 14 PhD or DIT students and more than 100 course-work Masters students in the Master of Science in Information Technology (IT) or the Master of Management Studies. There are about 20 students undertaking the postgraduate course in the enterprise architecture stream, from certificate to DIT level. These postgraduate courses were the first in Australia. This year, the IS staff members have started to provide vocational education and training (VET) level training in enterprise architecture under contract to the Department of Defence.

Despite being part of the UNSW, the IS group at ADFA has little contact with the School of Information Systems, Technology and Management in the Faculty of Commerce at the main campus in Kensington, New South Wales.

The ANU

At the ANU, IS has been part of the Faculty of Economics and Commerce since courses in IS were first taught. An early influence was Ron Weber, who had an appointment in the then Department of Accounting and Public Finance in 1977–78. Professor Weber had just completed his PhD at the University of Minnesota and was identified as the first Australian to obtain a PhD in IS. He recalls that at that point there were few openings for an IS academic and he had to rely on his background in accounting and auditing to get a job. Information systems appears to have been taught first as a separate unit in 1982–83, by Michael McCrae and Roger Debreceeny. In 1984, the faculty made the strategic appointment of a Reader in Information Systems. Roger Clarke led the discipline until 1995. Joan Cooper was also a reader in the department from 1990 until 1992.

The decade 1984–95 was marked by growth. A major was developed jointly with the separate computer science department, and successful joint Bachelor of Information Technology programs were introduced. These programs ranged

from highly technical to highly business-oriented programs, and were linked to the Bachelor of Science and Bachelor of Engineering at one end, and the Bachelor of Commerce and Bachelor of Economics at the other. The foundations for a comprehensive postgraduate program were laid, four PhD supervisions were completed and bodies including the Australian Research Council (ARC) awarded external research grants.

From 1995, a number of pressures meant that the discipline contracted. Although the number of IS staff at one point briefly reached five, a number left in the mid-1990s. The faculty made no senior appointment and, for the next five years, the discipline languished. By 2000, the group had shrunk to just two staff. At that time the Dean of the Faculty, Professor Tim Brailsford, showed confidence in the future of IS and electronic commerce and appointed the first professor of IS, with an endowment from the central administration.

The group has now increased so that there are eight staff and a good number of PhD, Masters and Honours students. Research activity has increased considerably, with much output in the past few years. As at other institutions, research is driven by staff interest and grant funding. This has led to significant diversity in research output, with key papers in areas such as the philosophy of technology, technology adoption and use, decision making, business ethics, open-source software and market modelling.

The ANU also has a College of Engineering and Computer Science, which offers programs in IT, computer science and software engineering. The IS group works with the IT staff in offering joint degrees and in program specification and design.

The UC

Information systems is a discipline in the School of Information Sciences and Engineering alongside network engineering, software engineering and mathematics and statistics. The school is in a division with the business and law schools. The UC has two other divisions: Communication and Education and Health, Design and Science.

Computing was a founding discipline at the UC when the institution was created as a CAE in 1971. The major in-house course for IT in the Commonwealth Public Service, the Programmer-in-Training (PIT) program, became the core of the computing degree, initially as part of the School of Administrative Studies. The foundation head was Digby Pridmore and, within three years, computing became a separate school. Information systems has always been organisationally co-located with the technologists, who can reify designs, rather than with the user areas. This has allowed a concrete, effective approach to IS teaching and research rather than IS being an abstract discipline that 'someone else can actually do'. Staff initially did not belong to streams such as software engineering, IS or

computer hardware; rather, they taught in one or more of many computing areas.

Separation has never been complete and IS is core to the Bachelor of Software Engineering and BIT as well as its own program, the Bachelor of Business Informatics. Information systems continues to teach a significant major into the business program and the major is available to the rest of the university—attracting, particularly, education students who want to become IT teachers. It also continues to teach its introductory unit into all disciplines. The postgraduate picture is similar, with IS teaching into the MIT as well as establishing the MBI and teaching into the MBA, M. Knowledge Management and so on.

In its 30-year history, IS has remained with its sister IT disciplines through a range of reorganisations. This history has allowed IS at the UC to integrate information, workflow and knowledge management to complement the traditional data management in organisations. There are some areas in the UC that teach IS-like units (the communications school teaches knowledge management and multimedia; the resources school teaches GIS; marketing teaches some Internet; education teaches some e-learning and so on). This teaching is coordinated mostly with the IS program.

Since becoming a university in 1990, the UC has emphasised its research program and has reached supervisory saturation point.

Distinctive features of the IS curriculum

Table 4.4 gives an overview of the programs offered at the three universities.

Table 4.4 Courses from which IS students are drawn, as of 2005

University	Undergraduate courses/programs	Postgraduate courses/programs
UNSW@ADFA	BSc, BA, service to BBus	MSc (IT), including streams in enterprise architecture and governance
ANU	BComm (IS major) BIT/BComm	MInfSysSt MInfSys
UC	BSE, BIT, BBI ^a , IS Major, double degrees, eg., B.Comm/BI; BSE/BI, BBI/Law	MIT, MBI

^a BI = business informatics

ADFA

The UNSW@ADFA follows the Association for Computing Machinery (ACM)/Association for Information Systems (AIS) curricula for its undergraduate and postgraduate courses. It reviews its curriculum every three years, with the last review in 2004. As the third year designed by that review has just finished, so another review is just starting.

The IS group within the school uses problem-based learning as much as possible within its undergraduate courses. There is an emphasis on systems thinking,

including Alter's 'work systems' concepts (as represented by the third-year subject 'Managing work systems'). The components of IT are not discussed until the 'Operating information systems' in second year. All first-year students are, however, expected to pass the International Computer Driver's Licence made available through the ACS.

There are no electives in the IS minor course and only one elective in the IS major. All students are required to undertake a project in the third year that acts as a capstone for the course. This project requires the students to work on tasks gathered through requests primarily to the Department of Defence. The sponsors of the projects are often senior defence officers.

The postgraduate courses are taught using 'flexible education'—that is, classes are available on campus but most of the students are distance students. WebCT is used at the moment to manage the courses, with student notes delivered as Word documents linked to WebCT or to a student portal or Wiki for some subjects. The college as a whole moved to OLIVE in 2007.

The ANU

The undergraduate IS curriculum is based on the ACS accreditation guidelines. Major curriculum reviews occur approximately every five years, with minor revisions occurring on a yearly basis. Staff levels have historically dictated the number of course offerings available, though recent increases in staff levels have meant more specialised classes can be offered at graduate and undergraduate levels.

Because of the group's proximity to the business disciplines, course delivery is frequently undertaken from a business and commercial perspective. Key undergraduate courses are offered in IS foundations (encompassing knowledge management, decision support systems, design and ethics), electronic business, analysis and design, IS management and project management. Graduate-level courses are offered in IS research issues, e-commerce for managers, strategic IS, communications technologies and issues in organisational IS. Staff members are encouraged to take their own approach to delivering course content, guiding students and providing pastoral care. This approach includes sharing course tutelage between staff members in order to support different perspectives and teaching styles.

The combined four-year BIT/BIS degree program that gives a business-focused IS major as well as the more technical knowledge in the IT major offered by the Department of Computer Science has been very popular with students until recently.

All undergraduate courses maintain at least one course web site. Content portals vary between staff members, classes and year levels. Some courses in the school use WebCT to manage and provide course content, while others maintain their

own content web sites under a faculty web server model. Some courses are also using weblogs to furnish class content.

The UC

Information systems at the UC takes the position that there is a core of IS knowledge and that this facilitates responsible and effective technology-based systems creation and adoption by a wide range of professional disciplines. Business is one application area, and the UC runs courses at undergraduate and postgraduate levels in 'business informatics' that combine IS and business. The IS group also teaches into areas including health informatics and educational informatics, but to date with much lower numbers than for business. On the technology side, IS has majors and electives in the Bachelor of Information Technology and Bachelor of Software Engineering and a combined BBI/BIT course.

The IS core comprises typical IS units (IS in organisations, database design, human-computer interaction, systems analysis and modelling, document and workflow management, systems projects and quality management) plus electives (in human-computer interaction, usability evaluation, knowledge management systems, business intelligence systems, database systems, advanced information modelling, general systems theory, IS management, business informatics case studies, information security, information law and IT and business alignment).

The development of students who have an understanding of the interpersonal and group processes required of IS and IT professionals is a feature of IS teaching at the UC. Students engage in group projects, role-playing case studies, online virtual organisations and presentations and they develop visual and written communication skills, critical thinking and teamwork skills.

All units are required to show how they embody: a) current research literature, b) appropriate IT, c) industry participation, and d) pedagogical technique. All units have a web site for teaching material and to facilitate communications. Units are developed by teams and each academic is on several teams in order to keep the unit content coherent. Academics are encouraged to develop new units in the areas of their research.

Industry interaction is important so the UC has tutors and guest lecturers drawn from industry and panels to advise on curriculum content while the IS group teaches into specific industry courses (for example, with the Australian Bureau of Statistics and Kaz Computing). The BIT has an industry project and the Bachelor of Business Informatics has an industry-supported internship that is becoming a significant vehicle for industry interaction.

Distinctive features of IS research

The UNSW@ADFA

The UNSW@ADFA IS group prefers the ‘design theory’ approach to research, which focuses on knowledge and theory concerning effective methods and structures for the development of IS. All of its members have consultancy and information and communications technology (ICT) industry backgrounds, so they favour the development of tools and techniques that are useful and usable. These group members undertake several consultancies each year, which often act as feedstock for their research papers.

Generally, the IS group members avoid applying for external grants. They prefer to obtain industry funding for their research, usually in the form of consultancy activity, which can form the basis for papers about how the work was undertaken.

The research interests of the members of the IS group include systems planning (business cases, tender evaluation), enterprise architecture, ICT governance (strategic planning, performance measurement), aids to human decision making, social networks, value systems, viable systems theory, household IS and e-government. The members of the group work with other staff of the school in gaming, complex systems and optimisation.

Table 4.5 shows the main areas of research interest in the IS groups in each of the universities.

Table 4.5 IS research in ACT universities

University	Areas of IS research focus	IS research groupings
UNSW@ADFA	Governance, DSS for crisis/anti-terrorist management, risk management, tools for human thinking	Virtual Environment and Simulation Laboratory (part), Decision Support ICT Governance and Enterprise Architecture group (see ADFA 2005c)
ANU	Strategic use of IT, e-government, technology adoption, intelligent systems/decision support, human-computer interaction, project management, theoretical foundations	National Centre for Information Systems Research
UC	HCI, ethics, ontology and systems modelling, virtual behaviour, informatics (e-research, e-learning, health informatics, e-law, e-government)	Human-Computer Communication Laboratory, Informatics Program (see UC 2005b)

The ANU

The ANU group is very active in research. The primary research concerns currently are the strategic use of IT across industry and government, IT adoption, e-government, intelligent systems and knowledge management, project management and network-centric warfare. The group is interested in the

'philosophy of technology' and argues for recognition of plurality in theory types and research methods in IS (see Gregor 2002, 2006; Gregor and Jones 2007; Fernandez et al. 2006).

Staff members have recently been increasingly successful in obtaining grants, receiving a number of ARC grants and applied research projects with government and industry. As an example, members of the group completed a large applied research project in 2005 commissioned by the Department of Communications, Technology and the Arts (DCITA) concerning the realisation of value from information and communication technologies. The report from this project was launched by the minister then responsible for DCITA, Helen Coonan, in Sydney in April 2005 and copies of the report were distributed nationally in conjunction with the ACS.

The group aims to focus on research issues that are of fundamental importance to the IS discipline and, to this end, hosts a biennial workshop on 'Information Systems Foundations'. The National Centre for Information Systems Research (NCISR), formerly known as the Electronic Commerce Research Group, is a vehicle for collaborative research within the IS group. Members include other faculty staff as well as external researchers and business figures. The centre has a regular seminar program that is designed to be of interest to a wide range of people.

The UC

In the 15 years since the UC became a university, IS research has been largely individual and therefore eclectic. Most of the IS staff come originally from industry, but have been in the education field for some time. Of the 11 staff, five have PhDs and two are enrolled. The group comprises roughly half active researchers, one-quarter occasional researchers and one-quarter who are not active in research.

In ARC terms, the research is not strong, but there is a history of work in human-computer interaction, modelling, ethics, IT education and e-government. Much of the research work is done in collaboration with Commonwealth government agencies and semi-government organisations such as Greening Australia and Kaz Computing.

The informatics theme is an attempt to bring the group's research work into a coherent framework, in particular to research informatics (or e-research—being the application of ICT to the research process and the use of its products), e-learning, e-law and health informatics.

The development of two research course-work units—research proposal and research methodology—and the weekly research seminar series have assisted in giving research students a better grounding and provided a forum for staff and visitor interaction with research students.

Key figures who have influenced IS in ACT universities

It is not possible to include all the people who have contributed to IS within the Australian Capital Territory, so just a few key people are included. The background for each of the three authors is given in accompanying vignettes. Each is currently a leader of IS at one of the three universities and so has some degree of influence on what is happening and what has happened, for varying lengths of time.

Several other names recur when contributions to the IS discipline in the Australian Capital Territory are discussed. Dr Roger Clarke led the establishment of IS at the ANU, where he was a reader in the Department of Commerce from 1984 to 1995. A vignette for Clarke is given separately.

At UC, Dr Igor Hawryszkiewicz was head of IS during the late 1970s and early 1980s and is now a professor at the University of Technology, Sydney, specialising in collaborative technologies. Dr Errol Martin was an associate professor and head of the school in which IS was located in the late 1990s. He maintained strong links with industry and chaired the ACS Information Systems Board for many years.

Penny Collings has been a long-time teacher and researcher at the UC after specialising in computer-supported collaborative learning and behavioural simulations. She became the head of the IS discipline (1992–2001) and was responsible for the development of several industry-based panels that provided input into the course redesigns that occurred every three years.

The status of IS as a distinct discipline in ACT universities

Mechanisms of control

Analysis of the vignettes accompanying this chapter show some signs of individuals in the IS groups studied taking up positions that have some prestige or degree of control. For example, Ed Lewis is currently the chair of the IT-030 Committee for Standards Australia that recently published *AS8015: 2005 Corporate Governance of Information and Communication Technology* and *AS8018: 2004 ICT Service Management* (now *AS/ISO 20000: 2007 Service Management*). McDonald is currently editor of the *Australasian Journal of Information Systems*. Professor Gregor was honoured with an award under the Australian honours system in 2005—possibly the first time that work in an IT field was recognised in this way (Gerry Maynard from Victoria received an honour at the same time).

The consensus of opinion among the authors, however, is that our field is not 'socially prestigious'. All of us have had experience with appointment and promotion committees where it is clear that the nature of work in IS is not well understood or regarded highly. Many of our staff have had experience in industry before joining academia so they have had relatively limited time to

establish a scientific reputation in terms understood by committees of social and physical scientists who have worked almost their whole careers in universities.

To summarise, the best we could say about this aspect of our discipline is that it is possibly emerging, but it is 'early days'.

Knowledge base

a) Recognised pedagogical approaches

A wide range of pedagogical approaches is evident in the teaching at the three universities: lectures, seminars, tutorials, group projects, case studies, presentations, use of online learning management systems (WebCT) and laboratory sessions. There are some discernible differences. The UNSW@ADFA has a philosophy of 'problem-based learning', while the UC focuses more explicitly on industry involvement in course development and on team teaching.

b) Recognised epistemological approaches

A wide range of epistemological approaches is evident in the research undertaken, with the groups tolerant of approaches ranging through quantitative survey work, qualitative case studies, the grounded-theory method, design approaches and interpretive work.

c) Unique symbol set

Our view is that we are not accepted as a distinct field in terms of a unique symbol system by outsiders. We do have commonalities in our symbol system with parts of computer science and software engineering, which is understandable, as we are allied fields, with some degree of overlap. We have overlap, however, which is of more concern in that people in application areas, who use IS and IT as tools, also use much of our symbol system. We find it hard to 'exclude these people as outsiders' and many cannot see why they should not teach IS topics within their own areas, as in health informatics. People outside IS, even within universities, have very poor understanding of what the term 'information system' means, either in relation to the artefacts constructed or as the name of the discipline. The continuing debate within IS about how our discipline should be defined only adds to the confusion.

d) Knowledge domain

The domain of knowledge is examined by analysing the commonalities in syllabi across all three institutions. Table 4.6 shows the areas of knowledge that are common across all three of the universities in the core knowledge in their IS majors. Two of the three universities follow ACS guidelines in planning their curriculum but these guidelines, as described in Underwood (1997), leave a great deal of discretion to the institution applying them.

Table 4.6 Knowledge areas common to the core of IS at all three universities

ACS core knowledge area nomenclature ^a	UNSW@ADFA course (IS major in BA, BSc)	ANU course (IS major in BComm)	UC course (IS major)
Introductory unit ^b	Introduction to IS (problem-solving approach)	Foundation of IS and e-commerce	IS in organisations
Program design and implementation (or systems building/software construction)	Exercises in Perl within IS in organisation; web design within design of IS	Introduction to programming	Use of SQL in database design and system building in IT projects; some use of design tools in designing human-computer interaction and systems analysis and modelling
Systems analysis and design	Design of IS	IS analysis	Systems analysis and modelling, advanced information modelling, document and workflow management, knowledge management systems
Database management	IS in organisations; design of IS	Relational databases, database systems	Database design, database systems
Project management and quality assurance	Selection of systems; management of work systems	Project management and IS	Systems project and quality management
Managerial and organisational issues ^b	Management of work systems; selection of systems; project	IS management	IS management; IT business alignment
Specialist areas ^b	Application of IS (elective choice of topics, including e-commerce, data management)	Electronic business; accounting IS; electronic commerce strategic issues; IT in electronic commerce	Document and workflow management; knowledge management systems; business intelligence systems; general systems theory; informatics case studies
Ethics/social implications/professional practice	IS in organisations; management of work systems	In many courses	In many courses, especially IT project
Interpersonal communications	Introduction to IS; management of work systems; IS project—all courses	In many courses	Throughout; specialist unit (professional practice in IT) for international students
Industry project	Third-year team project, 50% load second semester, canvassed from defence	Project management and IS	IT project; business informatics internship

^a ACS Core Body of Knowledge terminology unless noted

^b not named as such in the ACS Core Body of Knowledge

It can be seen from Table 4.6 that there is some commonality across the institutions in the core of their courses, which is evidence of common understanding of the domain knowledge that is central to the discipline. The areas in common include systems analysis and design, database design and management, project management, managerial and organisational issues, ethics/social implications/professional practice and interpersonal communications. Each university also provides coverage of specialist knowledge and application areas that reflect the interests and capabilities of staff.

There is variation in the degree to which programming and software construction are required. At the ANU, an introductory programming course is mandatory.

The UNSW@ADFA provides little education in programming in its IS courses, with its computer science programs covering programming in more depth. The main reason for this is that the careers of the undergraduates are prescribed and they involve no programming on the job, rather the supervision of civilian or service trade-trained personnel. The UC requires no mandatory programming study, which, again, is covered in IT programs, but students do receive experience of systems building in their project courses.

e) Range of knowledge types

There is a range in the types of knowledge presented in the courses taught in common. In the terms of Fitzgerald (2003):

1. *Rules or laws (as in the natural sciences)*. Examining the common syllabi shows that there is relatively little core knowledge of the natural-science type—there are few, if any, law-like generalisations; rather the knowledge falls more into the second and third categories in Fitzgerald's taxonomy. The knowledge, however, does rely on underlying theories of the natural-science type for justification and explanation of system-building knowledge. For example, guidelines for the construction of decision-support systems rely on behavioural science knowledge of human decision making.
2. *Evidenced guidelines*. The common syllabi include knowledge that is in the form of guidelines arising from practice. For example, the project management courses include knowledge of project management tools and practices such as software cost estimation that are based on empirical observation.
3. *Normative guidelines*. The courses in the common syllabi include what can be termed normative guidelines or 'design theory' (see Gregor 2002, 2006; Gregor and Jones 2007). For example, Codd's relational database theory is taught in all the database courses across the institutions.

Our conclusion is that we have a recognised common domain that might be expressed in this way: the IS discipline analyses human activity, determines the kinds of data, information and knowledge needed to enable people to act effectively and responsibly, designs technology-based systems to support them and evaluates the impact of those systems. Our knowledge is based on theories of information, human activity and organisations, IS studies analysis techniques and methodologies, human-computer interaction, data and knowledge representation and design, systems construction and validation and the impacts of systems on people, organisations and society. In this unique role, IS bridges the essentially content-free information technologies with the content-rich but often unstructured domain knowledge. To perform this function, IS embraces types of knowledge and epistemologies that differ from those that are traditional in the natural sciences and exhibits a more well-grounded, participative

style—congruent with a discipline that is at the intersection of science, technology and human and organisational behaviour.

Impact of local contingencies

Local contingencies have a fair degree of impact on how the discipline operates in the three universities. There are differences among the universities in terms of the faculties in which they are based and this positioning influences the types of subjects taught and the nature and practice of research. For example, the IS group that is in the College of Business and Economics at the ANU has a strong business orientation in its research and teaching. The case studies also show how the nature of ADFA and its role in educating personnel for the defence forces influences the choice of subjects offered to undergraduates.

Degree of professionalisation

Our reflection leads us to conclude that we have a relatively low degree of professionalisation in the discipline, using the criterion of the 'extent of variation in the nature of IS research'.

In terms of the content of our research endeavours, there is not a great deal of variation, as all our researchers focus on areas that are recognisably within the disciplinary bounds, and we have common understanding of one another's interests. A number of the people in our schools (and all the authors) do applied research, in that we build or help people to build artefacts.

In terms of the methods used in our research, however, there is very wide variation and the research methods taught to students do not necessarily suit the particular nature of IS as—at least in part—a discipline concerned with the construction of artefacts (as evidenced in our common syllabi). The IS students at the ANU are taught research methods in the same class as accounting, auditing, management and marketing students and do not currently have any exposure in these courses to 'design theory' (a shortcoming to be addressed in the near future). The situation at ADFA is similar, with only the UC explicitly addressing design-type research. This disjunction between what is taught as core knowledge and what is taught as research methods leads us to conclude that there is a low degree of professionalisation at the undergraduate level.

The UNSW@ADFA does teach research methods and professional practices as discrete units in its postgraduate courses. The emphasis on a professional approach is made evident in the tenor of the Doctorate of IT—an offering that is unique in the Australian Capital Territory.

At least in the UNSW@ADFA undergraduate courses, the focus is on providing 'well-informed users' rather than professional service deliverers. Few of its early graduates will serve as IS specialists while still in the military, except in some

logistics or intelligence areas. More will end up as IS professionals after on-the-job training in more senior positions.

Table 4.7 Analysis of ACT cases against an adapted professionalisation framework

Framework component	Assessment
Mechanisms of control	Emerging, but 'early days'.
Knowledge base	
a) Recognised pedagogical approaches	Yes, but a wide range.
b) Recognised epistemological approaches	Yes, many recognised and used.
c) Unique symbol set	No.
d) Agreement on knowledge domain topics	A discernible common core, but also variation across complete range of offerings.
e) Range of knowledge types	Yes, although rules of laws as in the natural sciences are used primarily as support knowledge.
Impact of local contingencies	Yes, placement of groups in faculties within universities and proximity to federal government influences research and teaching.
Degree of professionalism	Low degree. Research methods taught to students do not necessarily suit the particular nature of IS. There is more professional emphasis in the postgraduate courses.

Conclusions

Table 4.7 summarises the analysis of the IS discipline in the three ACT universities against the modified Ridley (2006) framework.

To conclude, each of the universities has a vibrant IS group, which appears happy with the work they do themselves. There are areas of concern, however, reflected in the different organisational placements of each group and the disciplines with which they interact most within their university. It would be hard to argue that the groups have an unambiguous identity visible to those outside the groups.

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