LAND AND GEOGRAPHIC INFORMATION SYSTEMS
- THE NEED FOR EDUCATION AND RESEARCH

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ABSTRACT

The interest in land and geographic information systems has grown dramatically over the past decade at all levels of government and in the private sector. The growth of interest parallels the growth of AURISA however a review of past URPIIS proceedings shows nearly a complete lack of mention of the need for education and research in the area. This paper addresses these issues and overviews current education initiatives in Australia. The paper concludes by making a plea for education and research having a higher profile in AURISA.

INTRODUCTION

No one would dispute the growth of interest in land and geographic information systems (LIS/GIS) over the last decade. Such interest has manifested itself in many forms and includes:

1. all States and the Federal Government having developed a land information strategy, and all having established some administrative arrangements to management and direct associated activities;

2. local government, utilities and many government departments developing or having developed systems;

3. private industry becoming increasingly interested in the area, particularly the computer software/hardware vendors;

4. seminars, symposiums and conferences concerned with LIS/GIS;

5. the growth of courses emphasising LIS/GIS;

6. paralleled interest overseas in both developed and developing countries.

The growth of interest parallels the growth in computer technology. To a large extent this is the result of the land and geographic information system concept being part of the emerging information society. The growth of interest in LIS/GIS has also paralleled the growth of AURISA. A review of past conference proceedings testifies
to the importance of the area to AURISA members. The papers presented at past conferences cover all the developments mentioned previously.

There is one area however which is conspicuous by its absence; education and research in land and geographic information systems or any information systems for that matter. As a consequence, the primary objective of this paper is to promote the need for appropriate education and research into LIS/GIS. By nature, land and geographic information systems are broad and multi-disciplinary. Therefore any attempt to discuss needs and issues regarding education and research may well be biased towards the background and interests of the author. This is knowingly the case with this paper and no apologies are made. Even though an attempt has been made to overview the whole area, it is recognised a planner, economist, geographer, lawyer, administrator, statistician or engineer would have a slightly different viewpoint.

If more people from whatever background or discipline become aware of the urgent need to consider education and research in LIS/GIS in the broadest sense then the paper will have achieved its objective.

THE PROBLEM

The need for professionals involved in the management of spatial data is urgent. Governments Australia wide are spending collectively tens or even hundreds of millions of dollars annually on developing LIS/GIS systems. The broad industry which manages spatial data in Australia would be well over a billion dollar industry (a profile of the surveying and mapping industry undertaken by the Australian Survey Office in 1985 estimated that the turnover of this industry alone was one billion dollars annually). Discussions with software/hardware vendors operating in the LIS/GIS areas, State and Commonwealth government departments, utility organisations, local governments and private enterprise, highlight the nearly complete lack of trained personnel in LIS/GIS. As a result the vast majority of people working in the area have come from other disciplines and are self taught for the most part on LIS/GIS issues.

This leads to one of the fundamental problems with education and research into LIS/GIS. It is a multi-disciplinary area which draws professionals from surveying and mapping, geography, computer science, planning, engineering, landscape architecture, statistics and administration, to name just the major disciplines. As a consequence there is no focus for the body of knowledge developing in the area. AURISA is really the only overall focus with URPIS proceedings the only real knowledge base in Australia. Other disciplines are active in the area but are generally narrower in scope than AURISA.

THE NEED

There must be a recognition that a new discipline is evolving, that of the land information manager. As stated by Hamilton and McLaughlin (1986), "The goal of the land information manager is to create and to maintain a system such that every land information user gets the information he needs when he needs it and in the form he can effectively use it". They explain that land information management (LIM) is "goal oriented" rather than "tool oriented". LIM is concerned with using the best and most appropriate tools, whatever the technology, to achieve the required goal.
Broad needs are evolving for LIM education in Australia at the Federal, State and local government levels, and in private industry. It is suggested that there are four general areas which have to be addressed.

1. Information management.
   1a. The nature of land
      - land use
      - land tenure
      - land value
      - land resources
      - physical attributes

2. Conceptual overview and the linkage of technology with administrative needs.

3. Technology.

4. Applications.

It is highly unlikely that these areas could be fully addressed in an undergraduate degree. As a result it is suggested that LIM education will build on appropriate undergraduate courses and will then specialise in one or more of the above areas at a graduate level (described in more depth below).

1. Information Management
   - the nature of information
   - theory of information systems
   - management of information systems
   - socio-economics of information systems

2. The Conceptual Overview
   - understanding and defining the concepts
   - definitions/terminology
   - the linkage of technology and administrative needs
   - the systems approach
   - linking the components/the institutions/politics

3. Technology
   - information collection, systems development, data management, information processing, data communications and information dissemination.
   - systems design
   - hardware/software
   - graphics and the management of spatial data

4. Applications

Most students studying LIM will be interested in applying the concepts and technology in a particular field, whether it is land administration, environmental management or in the mining area for example. User needs.

Another important component of LIM development is recognising the three way relationship between the government, private industry and educational sectors. This three way relationship is most important in developing research programs. No sector can undertake effective research without the help and cooperation of the other two.
PRESENT INITIATIVES

The LIS/GIS vendors and many government organisations are undertaking research and development in the area. What is needed is more education and university based research into land information management.

There is considerable activity in the broad area of information management at universities in Departments of Information Science for example. In addition there are courses on land and geographic information systems in a number of courses, such as surveying, town planning and geography. The only institutions to address LIM to any major extent are in the Departments of Surveying in the Universities of Melbourne, New South Wales and Queensland.

The program at the University of Queensland is based around the Key Centre in Land Information Studies which is a joint initiative of the University of Queensland, the Queensland Institute of Technology and the Queensland Department of Mapping and Surveying. The University of New South Wales program is jointly sponsored by the Schools of Surveying and Geography. They commenced a Masters program in land and geographic information systems in 1987.

The program at the University of Melbourne is centred on the Department of Surveying which was given a mandate in 1984 to specialise at both the undergraduate and graduate level on the management of spatial information. The land information management thrust gained considerable momentum in 1986 with the appointment of a Foundation Professor in the area and the establishment of a well equipped Land Information Laboratory. A major course revision of the undergraduate program is being undertaken at present. The objective is to produce a highly computer literate person with a good grounding in the basic sciences, mathematics and measurement sciences, while at the same time educating a person with an indepth understanding of the environment and a good grasp of the legal and administrative controls over land. The resulting professional must be able to bridge this gap and have the ability to take a broad overview of land related issues with emphasis on the management of spatial information.

CONCLUSION

The primary objective of this paper is to promote the need for education and research in land and geographic information systems. This is an issue which has never been addressed in URPIS conferences and is becoming increasingly important considering the rapidly increasing interest in the area and the move towards an information society.

One of the problems that has hampered the development of an education and research policy in land and geographic information systems is the multi-disciplinary nature of the area. There is no specific professional base on which to build and no extensive body of knowledge on which to draw. The trend is for studies in the area to be at a graduate level, building on one of the appropriate undergraduate programs. The paper highlights the major areas of study at a graduate level and briefly outlines the institutions around Australia which are attempting to develop suitable programs.
A considerable amount of research is undertaken in Australia in government, in private industry and in the university sector, although much of it is carried out in isolation. The paper makes a plea for more joint research programs which will be of a greater benefit to all sectors.

Australia is developing a reputation for excellence in land and geographic information systems, and has the potential to be a world leader. Our experience is already assisting Australia to win some valuable contracts overseas, thus supporting the present export drive of both State and Federal governments. We must capitalise on these achievements in order to maintain and strengthen our position, however this can only be done through education and research programs. As a consequence AURISA should make every effort to help and support education and research at all levels and in a wide variety of institutions.

REFERENCE