Innovation and Inspiration
Memories of the 1980s

Reflections on the First 20 Years of Surveying Engineering at UNB

Angus Hamilton, the SE Annual Report 1979/1980

The rationale for the establishment of the SE program was clearly spelled out by Dr. Konecny in a report presented at the annual meeting of the Canadian Institute of Surveying in February 1961 and published in the March 1961 issue of *The Canadian Surveyor.*

> *It seems to us that Canadian surveyors at present are divided into two groups, with very different interests. On the one hand we have the government surveyor, geodesist, or photogrammetrist, and on the other the private land surveyor. The two groups speak different languages because of their different educational backgrounds, and often they can find no common ground. We hope through our survey engineering course to educate men/women who will be able to appreciate and, most important, to co-ordinate one another's problems. Integrated surveys, which when intelligently planned, can serve the public and preserve the usefulness of all measurements, are today the aim of almost every country. However, such an integrated survey is possible only with the co-operation of each individual land surveyor. A common language must be found, and we are making every attempt to so plan that our graduates will be the interpreters.*

The objective for the program was reformulated and elucidated by the Departmental Advisory Committee in 1973.

> *To prepare the student to take responsibility for the design, development, maintenance, or monitoring of any surveying system, always taking into account its social implications, and to contribute to the improvement of surveying science in Canada.*

1980–1998. Dr. David E. Wells, joins SE

Canadian Accreditation Board, on behalf of the Canadian Council of Professional Engineers, renewed the Department's accreditation for 5 years.

1980. Accreditation

First workshop on Land Information Systems for 1990s, organized by Prof. Angus Hamilton. This became an annual event in N.B. known as LIS '90 and was held each spring.

1980. LIS '90

First word processor acquired — DECwriter — gave yeoman service until the Macs arrived!

1980.

The best test of any new concept is that of the market place. The SE concept has now passed this test with flying colours. Governments, the air survey industry, exploration companies, consultants, and others all vie for the services of our graduates. Moreover, the ultimate accolade to any new venture is to be replicated. This has now happened — twice. A survey engineering program was initiated at the University of Maine in 1976 under the aegis of the civil engineering department and a surveying engineering program was initiated at the University of Calgary in 1979 also under the aegis of civil engineering. Both programs are scheduled to achieve full departmental status similar to that of our department.

The concept of providing a common academic base for all the professionals concerned with positioning — whether it be positioning for scientific purposes, for mapping and charting, for exploration or construction, for boundary location, or for resource management — is now accepted. In 20 years we have gone a long way towards merging the "two solitudes" Dr. Konecny identified in the surveying and mapping community in 1960.

The curriculum, too, has come a long way. In 1961, when the concept of surveying in more than just a few elective courses in civil engineering was new, and with only three faculty members, Dr. Konecny was happy to have the last two years of a five-year program devoted to surveying. At that time satellite positioning, inertial systems, digital mapping, multi-spectral scanning, and ortho-photo mapping were only scientific concepts. Now, even with surveying engineering specialization in the second year, there is not room in the 180 credit hour program for all of our electives. One of the challenges facing us is how we should respond to the pressure for specialization at the undergraduate level.

Twenty years ago, it was a big breakthrough to establish that surveying was more than just a specialization within civil engineering. Now there are moves afoot for specialization within SE. It is interesting to speculate on the state of surveying if the breakaway from civil engineering had not occurred.

(Harvey Studios photo)

1980. Dr. Wolfgang Faig, Assoc. Dean of Engineering

Fully interactive digital mapping facility completed through acquisition of GOMADS software package.

1981. GOMADS

(Harvey Studios photo)

1981. Dr. Richard B. Langley, joins SE

Land Information Program Breaks New Ground

The Alumni News, University Perspectives, 24 March 1980

UNB, home of the first Canadian engineering school and one of the earliest Canadian computer science programs, is getting in on the ground floor of a brand new field, land information management. This time, we're an international front runner.

Starting in September, 1980, UNB will enroll its first students in a post-graduate diploma program in land information management, offered jointly through the departments of SE and computer science. For SE chairman Prof. Angus Hamilton, the establishment of this program is one step in a rapidly developing field. He envisions a time when we will have efficient, multipurpose information systems on every aspect of the physical environment, comparable to the information Statistics Canada can now provide on every aspect of our population.

The graduates of the new UNB program will be to land information what demographers are to population. A maximum of ten students will be admitted to the eight-month program, initially, Prof. Hamilton says. It is expected that the students will be professionals, with several years experience in agencies that use various types of land information.

There are many agencies now gathering, organizing, storing, distributing, and making decisions based on land information, Prof. Hamilton said. They include the federal surveys and mapping branch, the departments of the environment, transport, soils and resources, and the hydrographic service (nautical mapping), plus provincial departments of agriculture, highways and natural resources, and utilities and legal registries.

The information is acquired through inventories by personnel, low level (airplane) photography, and satellite photography, also known as remote sensing. The kinds of things they need to know include ownership, surface and shoreline typography, current use, resources, microclimate and soil characteristics. The UNB diploma program is designed to help professionals develop procedures to computerize and continually update that information.

1981–1994. New SE crest

(Harvey Studios photo)

1981–1983. Dr. Brad Nickerson, Lecturer

(Harvey Studios photos)

1981. Charlene Morrrison (B.Sc.E.(Surveying) 1983)

The functions of the UNB program are currently carried out to some extent by on–the-job training in the agencies involved, Prof. Hamilton says. But he reports one agency director as saying that by enrolling one or more members of his group in the UNB program, he estimated that more than a year would be shaved from the time the agency would need to get its information system in place.

Prof. Hamilton knows of no other program like this in North America, and says that Europeans are also looking with interest at the development of land information systems and expertise in the Maritimes. Spurred by the necessity for intense land and resource management, Europeans have been collecting detailed information on their physical environment for longer than their North American colleagues, but that information is "on paper," recorded on map sheets, which are tremendously bulky to handle.

For example, if one wanted to record all the renewable resources in New Brunswick, one would need 700 map sheets, Prof. Hamilton says. To record all the property ownership in New Brunswick would require 1000 map sheets. But all that information can be stored much more efficiently on a computer. The Maritime provinces, through the Land Registration and Information Service (LRIS), is a world leader in putting land information into computerized form.

The program will utilize the SE department's digital mapping laboratory. The lab is valued at $400,000 to $500,000, and will be completed with an $87,000 equipment grant to Dr. Salem Masry from the Natural Sciences and Engineering Research Council (NSERC).

The 'Woman' Engineer

Charlene Morrison (B.Sc.E.(Surveying) 1983), Newsletter, Vol. 9, March 1981

[Ed. Note: The first women to graduate from SE's variety of programs (B.Sc.E., M.Eng., M.Sc.E., Ph.D.), both from Canada and abroad, were:

Mrs. Olayinka Lasebikan Adekoya,	B.Sc.E.	1969	Nigeria
Mary Evelyn Ogilvie	B.Sc.E.	1972	Canada

Front left: Al Ruffman, Dennis Hosford, Adam Kerr (Chair), Ken Beanlands
Back left: Don McLarty, George Zarzycki, Zarko Jaksic, Keith Aucoin (B.Sc.E.(Surveying) 1971) (Secretary). (UNB Media photo)

1981. Advisory Committee

Jane Drummond	M.Eng.	1977	England
Susan Elizabeth Nichols	M.Eng.	1983	Canada
Mrs. Olayinka Lasebikan Adekoya	M.Sc.E.	1973	Nigeria
Sylvie Laroche	M.Sc.E.	1988	Canada
Susan Elizabeth Nichols	Ph.D.	1992	Canada]

The woman of today wishes to contribute something that is vital, and is responsive to the social and environmental needs of the community. A career in engineering provides her with that opportunity. An engineering background helps her to understand all the practical aspects of environmental concerns.

Seven per cent of UNB's engineering faculty are female. Because of the moral values and conservatism held by most young people who study engineering, women engineering students are treated as special, and are regarded with respect and protective concern.

Women regard engineering as an intellectual challenge. They are independent individuals who have broad specialized interests and social concerns. Because of their strong humanistic background, they have a tendency to regard situations with a subjective approach. The desire to help others is a strong component of their career.

As with all young engineers, male or female, the real competition begins when they enter the work force. Women must realize that they must prove themselves on the same basis as a man, and work at being a competent engineer. They should not anticipate special treatment and they should not scream discrimination at the first disappointment or criticism. Even though a female engineer has a family, she must pursue her career continuously. Based on the demands from her career, she will experience more complications than other working couples or single parents. A woman engineer must be able to assess her priorities and schedule her time to suit both her career and family.

Being an active minority group, which is working and studying in a male environment, women engineers appear to violate society's norms. Because of their sex, women engineers are continually singled out as being different from the vast majority of engineers. They are also singled out as

1982. Dr. Derenyi acquires Dipix ARIES-II digital image analysis system to be installed in the digital mapping lab.

1982. Left: LANDSAT; Right: SPOT. ARIES-II acquired to analyse remotely-sensed imagery stored in digital form from these two airborne sensors.

being different from the majority of women who have followed the more traditional academic disciplines. Women engineering students do not appear to be active in radical feminist organisations. However, they do appreciate the advancements made by the feminist groups during the 1960s.

Ending on a personal note, it doesn't bother me that history isn't called "her" story, or that hurricanes are usually christened with feminine names. I don't mind being referred to as a rodman, chairman, or instrumentman. I can open my own doors and pull out my own chairs, but I certainly appreciate it when someone else does those little courtesies for me. I don't support all aspects of Feminism. However, I do believe that equal opportunities and salaries should be available to both men and women.

Information System Sought

The Daily Gleaner, 19 February 1981 [DG]

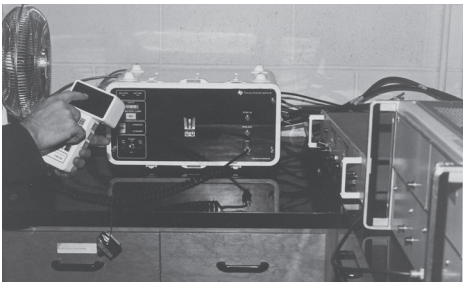
An attempt by surveying engineers and resource managers to come up with a Maritimes land information system by the 1990s reflects the high value placed upon land use in our day and age, a UNB professor suggested yesterday. Prof. Angus Hamilton, organizer of a two-day workshop on the subject of land information systems, said having detailed information about land within the province will enable decision-makers to put the land to its best use. Mapping is a time-consuming and costly proposition for governments and private industry today, Prof. Hamilton suggested. There is also a cost to society in general, he said, although many people feel land information is free.

Development of a land information system would amount to a type of "invisible mapping," Randy Trenholm, a co-chairman of the workshop, said yesterday. It would allow information to be gathered from the existing property maps, topographical surveys, sub-surface and geological studies, and numerous other land information reports or agencies.

Mr. Trenholm said with correlation of topography, geology, use, and ownership of land anyone could be able to obtain a complete picture of the location, size, and nature of a piece of property. In turn, that would make

(David Wells photo)

1982. Terry Arsenault (B.Sc. CS), Level I Computer Analyst



1982. TI 4100 GPS satellite receiver — the first commercially produced GPS receiver

for speedier and more complete decisions on land use. It would enable better farm and forest management.

The gathering of government and private industry representatives will wrap up today. Hopefully, conference organizers suggest, with some sort of consensus on developing the land information system. Delegates to the meeting are from this province, Nova Scotia, and Prince Edward Island.

Update: Ten LIS'90 Workshops were held from January 1980 to 1989. As the Chairman, Angus Hamilton, reflected at the time of the 5th workshop:

> *In 1981 we tried to get a handle on unit costs for the various products — in other words we concentrated on understanding what was going on rather than on how it ought to be done a decade later. In 1982 we looked at the new technology — especially in digital mapping — and we asked users what they would be expecting in 1990. Last year, at No. 4, we looked at the state-of-the-art in applying technology to the many systems and sub-systems in the Province and, for the first time, we had a formal Resolutions Committee.*

For the last 6 workshops, the format consisted of a review of the progress that had been made and then one or more problem areas were looked at in detail. A discussion of any resolutions ended the workshops.

In 1990 the format of the workshop was continued but the name was changed to "Land Information Forum: 1990." Also in 1990 a Land Information Council (LI Council) was established and became the principal sponsor. The LI Council was established with one representative from each of the participating disciplines. The members of the Council in 1990 were:

Ralph Brown, Association of New Brunswick Land Surveyors
Rejean Castonguay (B.Sc.E.(Surveying) 1963), CISM
Plen Dickson, Appraisal Institute of Canada Western N. B. Chapter
Michael Dillon, N. B. Association of Planners
James Dobbin (B.Sc.E.(Surveying)1977;M.Sc.E.1999), N.B. Bar Society
Angus Hamilton.

In 1994 the members of the LI Council participated in the Geomatics Atlantic Conference that was held in Fredericton instead.

1982. Left: Rock Santerre (Ph.D. 1989) with first GPS receiver used in SE; right: David Wells with TI4100 antenna on the roof of Head Hall

Development of a Digital Mapping Laboratory at UNB

Sam E. Masry, UNB Newsletter, Vol. 9, March 1981

Technological advances in computer hardware and software development are having a large effect on the activities of the SE department. Among the several research projects currently in progress is the development of a digital mapping system. The primary thrust on this project is being made by Dr. Salem E. Masry and Prof. John DeDourek in Computer Science.

The objective of the digital mapping laboratory is to have a hardware/software facility to carry out research and teaching in: data collection; data editing; organization; and information retrieval from both aerial photos and maps.

The hardware presently available in the department for achieving these objectives includes the following: Digital (DEC) PDP 11/60; 2 on-line disc drives (10 Mbytes); OMI AP-2C analytical plotter; 2 Tektronic CRTs; and two table digitizers. Developing a suitable laboratory requires the integration of these components.

In software development, the decision had to be made between:

- developing software which would require 5 to 15 man-years, or
- modifying and integrating currently available software packages for different applications.

The status of the laboratory at UNB is as follows:

- all necessary hardware components exist at UNB
- topographic mapping software is 90% complete
- polygonal mapping software is 50% complete.

It is expected that a digitizing and editing system will be ready for operation in 2 to 3 months.

In February 1981, Dr. Masry disclosed for the first time his "Digital Mapper" analytical plotter. Built entirely from "off the shelf" components at UNB, it operates as a rigorous analytical plotter. It has digitizing capabilities from either maps or a stereo-model, but not simultaneously.

Ann (Arnold) MacNeil, full-time secretary.

Dr. Demetrios Delikaraoglou (Ph.D. 1980), Research Associate

1982–1984. Ann MacNeil

(IBM Mainframes Album photo)

1982. IBM 3032, the most powerful single computer in Atlantic Canada

SE was consistently the heaviest user of the mainframes until the appearance of Macs and PCs.

1982–1984

It is expected that the cost for the complete system (digitizer, interface, computer, alphanumeric terminal) will be under $100,000. It is Dr. Masry's hope that the "Digital Mapper" (a.k.a.CARIS) will be totally manufactured in Canada.

The Advisory Committee 1981

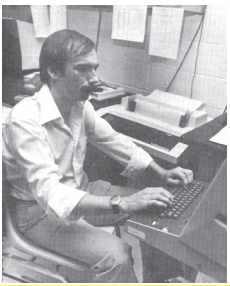
SE Annual Report

At the October 1981 meeting of the Advisory Committee, a number of issues were discussed including the computer science courses in the undergraduate core; the possibility of the department acquiring accreditation of its hydrography program from the International Advisory Board (IAB) of the International Federation of Surveyors and the International Hydrographic Organization; and the department's proposed undergraduate certificate programs.

During the discussion on the computer science content of the curriculum, the Committee and SE faculty were joined by Drs. Dana Wasson and David Fellows, and Prof. John DeDourek from the School of Computer Science. The Committee felt that a course in advanced scientific programming should be added to the core program. In addition, it was felt that computer graphics should be included in a modernized version of engineering graphics, and a modified course in data base structures and data base management should be offered as an elective. An outgrowth of the Committee's recommendation is the addition of CS 5705, Advanced Scientific and Engineering Programming, to the core curriculum beginning in 1983/84, and the faculty-wide upgrading of ME 1013, Descriptive Geometry and Graphic Analysis.

The Committee suggested that the university should seek accreditation from the IAB as offering a comprehensive hydrography program.

The Committee gave its approval in principle to the concept of developing certificate programs of eight months' duration. The Committee indicated it would rather see the programs identified and marketed as individual programs than as one general program.



Dr. Richard Langley studies the results of laser pulses fired at the moon which bounce off a reflector left there by Apollo 15 astronaut Col. James Irwin. (DG photo, 28 September 1982)

1982. Moon reflectors

(UNB Media photo)

1982. Prof. Angus Hamilton receives Earl J. Fennell Award from Steven Johnson, ACSM education committee chair