Heads and Tales

Department of Computer Science
University of Saskatchewan

1959-2018

Reminiscences from the various distinguished individuals who served as Head of one of Canada's finest Computer Science Departments.

Reminiscences from Department Heads were first collected for the celebration of the department's 20th anniversary in 1988, then for the celebration of the 35th anniversary in 2003. These have been brought forward for this document prepared for the celebration of the 50th anniversary.

September 2018

Before The Beginning

1959-1968
John Cooke and Blaine Holmlund

We began teaching classes in 1968 but the decade before 1968 involved many events that influenced the formation and nature of the Department.

In 1959, the U of S acquired its first digital computer, a Royal McBee LGP 30. It was considered to be a special research tool, and cost $30,000 ($130,000 in 1988 dollars). Its cost and use were to be shared equally by the U of S, S.R.C. and N.R.C. By today's standards it was a very limited machine. It was built with transistors and diodes. There were 16 instructions in the instruction set, and execution times were measured in milliseconds. Paper tape was used for input and output. The only memory was a magnetic drum, consisting of 64 tracks, 64 sectors, and 32 bits per word. The mean time between failures was sometimes hours but often minutes. It was a single user machine. (Yes, Virginia, before I/O overlap, before multiprogramming, and before timesharing or remote access.) The staff consisted initially of one “technician” whose annual salary was around $3000.

After a lengthy debate, the U of S eventually accepted that more computing capacity was needed, and in August of 1963, an IBM 1620 Model 1 was installed in the Engineering building. (It was too large to go in the elevator in the Arts Building.) This was upgraded in the spring of 1964 to a Model 2, using core memory (40K digits), a disk, and a disk operating system, and thus started the punched card era on campus. Most significantly, a real compiler was available. (Yes, Virginia, it was FORTRAN). Users operated the machine and punched the cards themselves, booking a time when the machine was free.

Demand for computing continued to increase, much to the dismay of those holding the purse strings. When the much larger IBM 7040 was installed in July 1965, it was justified not so much by the acceptance of a need for more computing, but because the 60% discount offered by IBM was seen to be a good deal and was shortly to be withdrawn. Further expansion (from 16K 32 bit words to 32K words of core, among other additions) had been agreed upon before the initial installation. The 7040, now serving both the Administrative and Academic communities, primarily with FORTRAN and COBOL, continued as the main engine of the Computation Centre until after the formation of our Department.

In this decade, the changes in hardware and software were accompanied by considerable growth. The number of users increased from a handfull in 1959 to hundreds by 1968. The staff of the Computation Centre increased from 1 in 1959 to over 20 by 1968. The budget increased from $15,000 per year in 1962/63 to over $250,000 by 1968. Faced with these geometric progressions, it is hardly surprising that the committee memos of the period show an obsession with control and charge back of costs to users.

Along with the growth came recognition of the need for educating potential new users. A early as 1959/60, Math 311b, Numerical Analysis, lists as its final topic “programming of the LGP 30

computer". The first class devoted to programming was Math 211b, Computer Programming, first offered in 1963/64. By 1964/65, Math 211b had become

> *"A general introduction to computer programming. Machine language programming using the M3 and LGP 30 computers. The use of compilers and in particular FORTRAN on the 1620 computer. Problems will be run on the computers throughout the course".*

(Yes, Virginia, either the students or the teachers must have been smarter back then.)

Also in 1964/65, the famous Engineering Spring Programming Camp began as GE 301d, Programming of Engineering Problems.

> *"This class will consist of lectures and problem periods covering digital computer programming. Although the main emphasis will be on FORTRAN programming, machine language programming will also be introduced."*

Developments were also occurring in Commerce, which moved rapidly from one half class in 1965/66 to two half classes in 1966/67 to six half classes and a combined "Quantitative Analysis and Computers" major in 1967/68. The time was right to try to form a unifying Department.

As early as 1963, the Advisory Committee for the Computation Centre had discussed the desirability of a Computer Science Department. In December 1965, it recommended that:

- A Department of Computational Science be created on the Saskatoon Campus.
- It should be a University Department.

These recommendations were referred to the Interdisciplinary Committee of Council, which concurred with the recommendations, adding a third, namely that:

- The Department should be directly responsible to the President or his designate.

On March 1st, 1966 Council accepted the three recommendations. Following approval by Senate, the Board of Governors had the authority to establish and fund a Department of Computational Science.

An extensive search was then made for suitably qualified candidates for Head of the new Department. Of several external candidates considered, only one was both qualified and interested. He wanted a salary slightly more than twice what the University was prepared to offer. In the spring of 1967, the search committee recommended that Blaine Holmlund be appointed Head beginning July 1, 1967. Professor Holmlund had not applied for the job, nor was he aware that he was being considered. He was then Director of the Hospital Systems Study Group, an organization he had founded in 1965 to carry out computer-related research and development in University Hospital. He had previously successfully established, and was the Director of, the Division of Biomedical Engineering. The Search Committee felt that with this interdisciplinary, computer-related, organizational experience, Blaine Holmlund was well qualified to launch the new Department of Computational Science.

In August 1967, Professor Holmlund made a submission to Principal Begg entitled "A Program for the Computational Science Department". In that document the discipline was defined in a broad way,

"Computational Science is not only the design of computing devices, nor is it just the art of numerical computation, important as these topics may be. Computational Science is the art of collecting, transmitting, storing, manipulating, and representing information. It is primarily concerned with the body of knowledge and technology needed to understand and participate in the design, development and application of systems for handling information in the most effective manner. All forms of information ,– numeric, algebraic, verbal, visual, graphic are of interest to computational science. The computer scientist is interested in discovering all means by which this information can be processed and analysed, whether in the realm of business, engineering, mathematics, medicine or education."

Computational Science was to be both pure and applied, and it was to cut across traditional boundaries between academic disciplines. (Yes, Virginia, it was seen to be a much bigger field than Numerical Analysis + Programming, the model on which most Computer Science Departments were started.) The program proposed to amalgamate existing courses in topics considered part of Computer Science under the rubric of the new Department. A new major was to be developed in Arts and Science. Computational Science was to become involved with the new Quantitative Analysis and Computers major in Commerce, and a graduate program was to be developed immediately. These proposals, with the exception of the graduate program, were all approved by the respective bodies. Professor Holmlund then left to spent a rewarding half-year learning more about Computer Science at the University of Wisconsin, and giving up an approved leave to pursue doctoral studies to do so. In March 1968, he was shocked to find that his initial budget proposal had been savagely slashed. For the first year of actual classes, 1968/69, the new Department was to be staffed by one person, namely the Head, and various other part-timers whose primary loyalties were to the Computation Centre, the College of Commerce, the Department of Mathematics, or the College of Engineering. Professor Holmlund showed his considerable negotiating skills in persuading these various individuals to make the necessary committment to the new Department.

Thus the Department began. It had support from various competing factions on Campus, but more as compromise than by conviction. Its first Head was an able organizer but had little formal training in the field. It was started grudgingly, and on a shoestring budget. Although this beginning was not propitious, a balanced perspective of what the department could and has become was established. So was a pattern of University parsimony that has lasted to today.

[Note: This summary was written for the Department's 20th anniversary celebration in 1988.]

The Beginning

1968-1974
Blaine Holmlund

Starting a new department in an established discipline is challenging and rewarding. Establishing a new department in an emerging discipline is more challenging, and doubly rewarding. I feel priviledged to have had that experience.

There were three main challenges in those early years. Firstly there was considerable debate in the '60s about whether Computing Science was an academic discipline worthy of study within a University. Even among the "converted" there was considerable disagreement about the nature of the discipline, and few good texts to define it. Secondly, there were few people with formal education in the field, and enormous competition among universities (all starting new departments) for the few who were being educated. Thirdly, the birth of the Department coincided with the beginning of a period of financial constraint for the University which has continued with varying degrees of severity ever since. In the spring of 1967 there was a potpourri of classes in various North American Universities, but few formal undergraduate programs. An exception was at the University of Wisconsin, which had adopted in 1966 the recommendations of an ACM curriculum committee. Fortunately, I had previously accepted a doctoral scholarship in biomedical engineering, and had made housing arrangements in Madison. I therefore decided that the best way to learn what computer science was all about was to go to the University of Wisconsin and sit in on as many classes as I could. The initial course structure developed for our Department was patterned very closely after that in Wisconsin.

The decision to make the Departmment a "University Department reporting to the President or his designate" was wise. This allowed us to develop in a more balanced way than would have been possible within the culture of a single college. During the first year, the President's designate was Lloyd Barber, Dean of Commerce. From 1968 to 1974, I reported to Carlyle King, first in his capacity as Dean of Academic Services, and then when he became Assistant to the Principal.

For the first two years, I was the only full-time faculty member. Glen Peardon of the Computation Centre and Kathleen Booth of Mathematics were half-time appointments. Commerce provided John Cooke, Winfried Grassmann and various others for selected classes, and a total of 21 different people taught classes in the first two years. The teaching loads imposed on the staff were enormous, and I still feel guilty when I recall that Glen Peardon taught 6 half classes while on a half-time assignment to the Department.

Some relief came in 1970/71, when four new positions were approved. Two of these, John Cooke and Winfried Grassmann, were to be transferred from Commerce. Murray Pask, a recent MSc graduate from Engineering was hired, along with Paul Tremblay from Case Western University. With one more position in thee following year, Bob Kavanagh from Cal Tech was hired. Cooke, Grassmann and Kavanagh all held Doctorates in related disciplines, but Tremblay was the first formally qualified computer scientist. Three further positions were given for 1972/73, bringing the establishment up to 9 full-time positions. Paul Sorenson and Rick Bunt were lured from Toronto in 1972, and Bob Probert from Waterloo in 1973, all with PhDs in computer science. We now had the complement I felt we needed in 1968.

The Department had received approval in spring 1968 to offer a BSc General and a BSc Advanced program in Arts and Science. It was also to take over the Computer classes involved in the combined Computational Science and Quantitative Analysis in Commerce. In 1971 approval was obtained for an Honours program in Arts, and in 1972, the combined major in Commerce was replaced by two separate majors, one in Computational Science and one in Management Science. In 1968/69, 10 different undergraduate half classes were offered. One of these was transferred from Arts, and five from Commerce. Four new half-classes were taught: 212 Introduction to Systems Programming, 313 Intermediate Systems Programming, 314 Information Stuctures and Processing, and 415 Theory of Computer Languages and Compilers. For 1969/70, 7 new half classes were offered, including 394 Operations Research, 416 Compiler Construction, 417 Heuristic Problem Solving and Modelling, 419 Theoretical Concepts, 420 Principles of Logic Systems, and 421 Sequential Machines. No new classes were offered in 1970/71, but minor numbering changes were made. However, for 1971/72 substantial changes were made, establishing a pattern of classes that would remain for several years. These changes involved renumbering first and second year classes, and introducing 9 new half-classes, reflecting the interests of the new faculty. The new classes were: 380 Decision Models for Computer Systems Management, 422 Advanced Computing Systems, 427 Combinatorics and Graph Theory, 428 Analysis of Algorithms, 441 Text Processing and Information Retrieval, 460 Computer Graphics, 495 Operations Research 11, and 496 Markov Chains and Queueing Theory. With the two major programs in Arts and Commerce in place, and with a wide range of classes combining applied and theoretical aspects of the field, by the end of my term as Head we had one of the best undergraduate programs in Canada.

I recognized from the start that a graduate program would be essential if we were to attract and keep good faculty. In the first year of operation we taught a number of graduate classes, and were given permission to accept MSc students on a special case basis. An attempt in 1968 to establish a formal MSc program and a graduate diploma program was rejected by the Dean of Graduate Studies. In retrospect this was quite appropriate since we had not yet acquired a sufficient number of faculty formally educated in the discipline.

With the addition of Bunt and Sorenson the situation had improved, and in 1972, during my Sabbatical leave at Edinburgh, a new proposal was steered past various obstacles by my eventual successor, John Cooke. A formal MSc program was approved, but only on the condition that no new resources were to be provided for it. Prior to 1972, 3 students had graduated with MScs granted on a special case basis. Formal approval opened the way for full-time graduate students, and access to various forms of additional funding.

During these years, the IBM mainframe facility grew considerably: from a 7040 in 1965 to a 360/50 in 1969, to a 370/155 in 1972, and finally to a 370/158 in 1974. Although a small time-sharing system (the HP 2000) was installed in 1972, student computing experiences were almost solely card and batch oriented. An innovative solution to the problem of fast turnaround for small jobs was found with the development of the HOTT (Highly Oriented Towards Turnaround) monitor in the fall of 1969. This was one example of the close relationship between the Department and the Computation Centre over this period. The mainframe was well managed and provided reasonable service to the students by the standards of the time (It also provided a thorough grounding in the miseries of JCL.) However, our students were only one group among many users, and other facilities were necessary for real hands-on experience or experimentation. With the advent of "mini-computers", a "computing science laboratory" became an economic possibility as well as a necessity. A DEC PDP 11/20 was installed in 1972, and we learned to replace the miseries of JCL with those of switch panels, punched paper tape and primitive operating systems. This was the start of a computer lab that could form a basis for experimentation.

In conclusion, my seven years as Department Head were among the most satisfying of my professional career. The students and faculty who venture into a new area of activity are a special and pioneering breed, and it was a priviledge to know and work with them. It has been particularly satisfying to watch the Department develop and mature over the years. I believe it is now one of the best departments of its size anywhere.

[Note: This summary was written for the Department's 20th anniversary celebration in 1988.]

Maturing Despite Problems

1974 - 1981
John Cooke

In early 1974 an extensive search was made for a new Head who would be a senior computer scientist with administrative experience and the ability to attract research funds. No candidate acceptable to the faculty was found and I reluctantly agreed to do the job for one year. Even more reluctantly, I accepted a three year term in 1975, and a further three years in 1978. As I have often said, “What did I do to deserve this? You only serve five years for manslaughter these days”.

What was the situation in 1974? On the bright side we had seven good faculty members, all with PhDs. We had good undergraduate programs in Arts and Science, and Commerce, a small MSc program, and the nucleus of a computing laboratory. On the dark side, we had a heavy committment to offer service classes, enrollment in our undergraduate classes was expected to rise, and the faculty establishment was too small to cope with the existing load, let alone the growth. For support staff we had one secretary and one half of a technical position. Funds that could be spent at the discretion of the Head amounted to a meagre 4% of the annual budget of just over $200,000. Funds for the acquisition of hardware for the lab had been approved, but there was no provision for operating expenses. SaskComp had just taken over the University mainframe and associated staff. Most seriously, our past record of publications and research grants, while improving, was barely adequate. Yet with suitable support, these problems seemed solvable. We did not receive the necessary support.

From 1974 to 1980 the faculty establishment remained constant at nine. There was a critical national shortage of recent PhDs in Computer Science, and during most of these years at least one of these positions was not filled. When qualified people became available, their skills often did not match the Department's needs, especially in the information systems area. Grant Cheston joined us in 1975, and Ken Kozar in 1976. Kozar had a solid background in M.I.S. and was crucial to the Commerce program. He left after only one year, partly because we could not match his market value, and partly because of the conflict of ideas between Computer Science and M.I.S. Bob Kavanagh left to become Director of Academic Computer Services, and Bob Probert returned to Ontario in 1978. Gord McCalla and Hassan Reghbatti were hired in 1978 and Charlie Colbourne in 1980. Cheston and McCalla are still with us, now senior and much respected members of the faculty. Convincing new faculty to join us and persuading current faculty not to leave were among my most time-consuming activities in this period.

The structure of the undergraduate program was not changed. Class descriptions and titles were modified periodically, but class contents and assignments in almost all classes were changed every year to reflect the continual changes in the field. Enrollment in undergraduate classes rose from 1580 to 2672, the average class size increased from 34 to 59, and the number of 3rd and 4th year majors rose from 69 to 110.

While the size of the undergraduate program almost doubled, the graduate program remained static. This was caused partly by the lack of suitable students (the job market was too attractive), partly by the lack of resources for teaching and supervision, and partly by the lack of suitable financial support for the graduate students. Despite this, research grants increased from $28,000 to $142,000 and the faculty output of books, articles, and conference presentations increased considerably.

Adequate computer facilities were and are essential to any good Computer Science program. In early 1974, the U of S capitulated to Government demands, and against the strong advice of our Department, allowed SaskComp to take over hardware, software and trained staff as part of a new Provincial Computing Utility. Under SaskComp the University was committed for many years to an inflexible outdated mainframe suitable only for batch processing. It had no control over the prices charged for computer services, which increased by substantial amounts for each of the first four years of SaskComp domination. Worse, the University had lost control over the unused power of the mainframe with its very low marginal cost. As the volume of use increased, so in direct proportion did the SaskComp bills to the University.

SaskComp now served many different customers from its campus installation. Invariably the SaskComp staff became less responsive to our needs, and less willing to accept innovation that would impact their other customers The HOTT monitor, which lasted from 1969 to 1979, was based on rapid turnaround: you put your cards in, waited a minute or so, and retrieved your error messages at the printer. I remember one occasion when the turnaround changed suddenly from the traditional minute or two to 30 minutes or more. This coincided with a major database update for a large non-university customer. When I complained I was told, “Surely you don't expect us to put the interests of students above those of a really important customer”.

By the mid 1970s it was obvious that the keypunch should be dead, and that the age of interactive computing was upon us. SaskComp argued that IBM's Time Sharing Option offered economical interactive computing on the mainframe, a claim that would have gone over well at a meeting of the Flat Earth Society. Eventually the University acquired a DEC 2050 for general purpose time-sharing. This system could not support sufficient terminals for general Campus use and our student needs, and so DEUS was designed by University staff: 32 dumb terminals controlled by a DEC 11/70. Student jobs were edited on the 11/70, sent to the SaskComp mainframe for processing in a high priority partition, and returned to the 11/70 for spooling and printing. Both the 2050 and the 11/70 were “owned and operated” by the U of S. During this difficult period, Leo Kristjanson, then Vice President (Planning), showed considerable understanding and courage in breaking the SaskComp control. Both Digital systems were used extensively by our students and provided a considerable improvement over the previous facilities.

A Computer Science department must have a computer lab allowing innovation and hands-on experience unfettered by the needs of other users. This is just as essential as a chemistry lab is to a chemistry student. Our research lab was started in 1971 with a PDP 11/20 paper tape machine. In 1975, a PDP 11/40 was acquired and by mid-1975 UNIX had been installed. (Yes, Virginia, an early version of the same Unix they sell on TV today.) These two machines were the heart of the research lab from 1975 to 1981. Over this period funds were scrounged from various reluctant sources to allow the expansion of core, lines, disks, tape drives, throughput and terminals. By 1981 the system supported 20 terminals and 200 active users. Much of the credit for this goes to Bob Kavanagh, and the two managers, Peter Hardie and Dave Bocking. (Since they had no staff to manage, the use of the term manager could be queried.) Most of our purchases proved to be a wise use of limited funds, but we remember the infamous MegaStore, intended to add 1 million bytes to main memory, and improve throughput dramatically. It cost $24,000, crashed the system several times a day, and, when operational, only slightly degraded system performance.

Despite all its problems, this kluge of a system serendipidously allowed hundreds of our students to obtain the hands-on problem solving experience that led to their successful careers as technical specialists. It also illustrated the absurdities of SaskComp pricing policies. A simulation that would have cost $600 per run at SaskComp rates, could run overnight under UNIX at a marginal cost of $0 per run. Partly as a result of his experiences with our lab, Bob Kavanagh was well equipped when he became Director of Academic Computing Services to restore University control over its central computer resources.

I cannot reflect on our budgets from 1974 to 1981 without an overwhelming sense of unfairness. Over this period, undergraduate enrollments and class sizes almost doubled, and research and extension work increased spectacularly. Our budget rose from $210,000 in 1974/75 to $460,000 in 1980/81. This increase hardly covered salary increases and inflation costs. Faculty positions were unchanged. Secretarial positions increased from one to one and a half, and technical positions from half to one. Whoopee!

Why were we treated so badly, despite repeated pleas, threats and bombardment of the administration by endless statistics? The University was under severe financial pressure for most of this period. (When has it not been?) When our faculty positions went unfilled, we were asked to justify why the positions should be kept on the books. Far from getting new positions, I had to continually fight to keep the positions we had. The University Studies Group began publishing statistics in 1975, and they clearly documented our disadvantages, particularly in comparison to the other physical sciences. Unfortunately, administrators and influential committee members could not understand the statistics, or chose to ignore them.

Probably the main reasons for my lack of success in obtaining more funds from internal sources were lack of understanding and sympathy on the part of senior administrators, antipathy to the discipline from faculty members in other disciplines (not really a science, and threatening to human dignity), and our weak organizational position.

As a University Department we reported to the President's Designate. Without the protection of a powerful Dean, we needed strong support from the Designate, and this we never got.

Carlyle King, to whom we reported from 1969 to 1977 was unfailingly courteous and helpful in small matters. Unfortunately he believed that we had been adequately funded in 1971. He had little appreciation of our discipline, and never accepted the enormous cost in faculty time of large section sizes, endless labs, and relentless annual changes in classes. We reported to Mel Preston, Vice-President (Academic) from 1977 to 1980. After we rejected his demand that we agree to become part of a Department of Applied Mathematics, his antipathy to the discipline turned to outright hostility. My most enduring memory of this unfortunate relationship was a department meeting at which he made an appearance, listened to our case for more support, rejected it totally, and then stated that we could not expect two hours of his time every year. This was the President's designate!

Eventually, organizational changes at the University made it necessary for us to become part of a College. We were invited by Peter Nikiforuk to become part of the College of Engineering while continuing to offer our programs in the other Colleges. This move was supported by Arts and Commerce, who both saw us as desirable members of their Colleges, but also as a potential cuckoo in their nests. The change was approved by our Department after considerable debate, and ratified by the other bodies. Thus for the last year of my term, while we remained physically on the other side of the Campus, we became a department in the College of Engineering. I remain convinced it was the right decision.

From 1974 to 1981, the Department matured. Its publication record was impressive, especially the textbooks written by Paul Tremblay and his various co-authors and published by McGraw-Hill. The considerable growth in research grants reduced dependance on local funding. Large numbers of students graduated with highly respected degrees. We influenced computing in the University at large, and played active roles in professional and extension activities. Yet I feel that my major accomplishment over this period was, like the little Dutch boy with the finger, to prevent disaster. It would have been so easy to let the Department collapse into mediocrity. At the end there was a good faculty, a strong sense of “togetherness”, no rival factions, and no personal enmities. Despite the problems, the Department had a solid academic record, and a national reputation as a good Department to be part of. For this, thanks are due to the students, staff and faculty who tolerated the difficult conditions of the times.

[Note: This summary was written for the Department’s 20th anniversary celebration in 1988.]

A Demand for Growth

1981-86
Paul Sorenson

I was first asked to consider the position of Department Head while on my sabbatical at the IBM San Jose Research Laboratory in 1980 and I rejected the offer. After some arm twisting and considerable trepidation, this naïve fellow still in his mid-thirties agreed to become Head in July of 1981. My predecessor, John Cooke, had worked hard to establish a good, young and collegial department; however, his efforts to obtain additional resources often fell on deaf ears.

With 1981-82 enrollments promising to "jump through the roof", limits were imposed for the first time on enrollment in the introductory course taken by Computational Science majors. This was the beginning of a trend that would, by 1984, result in limits on first, second and many fourth-year courses, and an entrance average from high school of over 83%. In the period from 1978 to 1981 enrollments jumped by greater than 50% and, of more concern, by greater than 60% in upper year classes taken by majors. The rush to get a degree in this "new", exciting and expanding field was remarkable and not predicted by even the most optimistic computer pundits. Job opportunities were excellent, with all graduates securing two or three offers. One top graduate reportedly received nine offers from firms all across Canada and spent the months of October and November, 1981 managing his interview and airline schedule.

My first major task was to prepare the 1982-83 budget. After reviewing previous budget requests and examining the Department's position relative to the other major units of the University, I was struck by the inequity of our situation. Our teaching load was double that of a number of other departments on campus! Perhaps the most revealing statistic was the fact that between the years 1973-74 and 1979-80 the Department's share of the University budget had actually shrunk from 1.09% to .79%. As I stated in correspondence with the Dean of Engineering in December 1981,

> "*... it is indeed a travesty that this institution has chosen to reduce the instruction expenditure of Computational Science more, in relative terms, than any other unit in spite of repeated requests for support by our Department Head. It is [also] ironic that during this period Computational Science grew more in terms of student enrolment than any other unit on campus — an outstanding case of 'inverse planning'*".

The set of objectives that I placed before faculty for 1981-82 were

1) to reduce the unreasonably high teaching loads,
2) to increase the staff positions,
3) to complete the implementation of the new curriculum that was proposed in July, 1981,
4) to enhance laboratory facilities (particularly in the area of computer graphics), and
5) to develop closer ties with the other departments in the College of Engineering.

In reality, it took the remainder of my term in office to address many of these issues. Clearly, the most important task was to reduce teaching loads by increasing the number of faculty. The desperate situation warranted a direct appeal to the three Deans most involved with our programs: the Deans of Engineering, Arts and Science, and Commerce. The result of several meetings was a letter sent by the Deans to the President supporting a long-term plan of action to address the inadequate resources and the immediate granting of a new faculty position. No immediate response agreeing to a long-term plan came from the President, however. Faculty pressed for a direct appeal to the President to ensure that he was made fully aware of our critical situation. At a meeting on March 16, 1982 involving President Kristjanson, Dean Nikiforuk and myself, the future prospects for the Department were laid out. The President agreed to more resources (one new faculty position, a term appointment position to be turned into a tenure-track position the following year, the upgrade of a half-time secretary position to full-time, and a new technical support position subject to available funds the following year). He felt unable to commit to a long-term plan because the current University budget was tight and the future extremely uncertain. With no long-term plan, this scenario of yearly appeals continued throughout my term in office.

A University-wide hiring freeze in January 1983 resulted in cancelling the plans for new positions in 1983-84. Another desperate appeal to the President in May, 1984 resulted in a third new faculty position. A commitment by the College to development of computer engineering created a fourth position in 1985. Despite these additional faculty, the Department's teaching load was still amongst the highest in the University at the end of my term as Head (July, 1986).

The lack of computing facilities and support staff was almost as severe as the problem of high teaching loads. In 1981, the DEUS/SaskComp batch submission facility was our primary computing environment It consisted of 44 terminals hooked to a PDP-11/70 that allowed editing of source files prior to submitting a job on a batch basis to a high pnority partition on SaskComp's IBM mainframe. It serviced the courses for all of the first two years and part of the third year of our programs. Students were totally frustrated with the long lineups for terminals (sometimes as long as 2 hours) and the unreliability of obtaining printed output. Analysis done at the time showed that to service the existing student load, assuming an average of 3 hours on a terminal per week by each student, required that every terminal be fully utilized for 18 hours a day (non-stop with no breakdowns!). A PDP-11/40, purchased in 1975 and used primarily for research and graduate courses, was breaking down on a daily basis and was out of commission for nearly 3 weeks during the fall term in 1981.

With the support of Bob Kavanagh, now Director of Academic Computing Services, a Vax-11/780 (MaxVax) was requested and funded at a price of $300,000 from a one-time capital development grant provided to the University. It was installed in July, 1982 in time to handle the courses 2nd-year and above that fall. DEUS soon became very unsatisfactory and technically obsolete for the first-year classes and was replaced with a local area network of 40 Zenith PCs (the Camelot Lab) in July, 1984. It was at this time that the Department began to assume responsibility for operating the Camelot and MaxVax computing facilities and formally took over this responsibility in May of 1985 with a transfer of operating budget and personnel from Academic Computing Services. To handle the growing and more diverse computing requirements for the upper-year courses, the Vax-11/780 was upgraded to a Vax 8600 in the summer of 1986 and the new ACL (Advanced Computing Laboratory), consisting of twelve Sun 3/50 high-resolution bit- mapped workstations with a file server hooked together in a local area network, was installed in the fall of 1986. For the

first time in its history, the Department had acquired reasonably adequate computing resources to fulfil its teaching commitments.

With the growth of the Department both in terms of personnel and computing facilities, lack of space became an acute problem. Our location in the Commerce Building was tenuous because the College of Commerce was also growing at a rapid pace. In 1981, some space was made available in the Engineering Building for research facilities and staff when the Vax-11/750 research computer (Kimnovax) was installed. Plans to move the Department to the Engineering Building were resisted in 1982 because the proposed space was totally inadequate for the long-term growth of the Department. Finally, in 1985 a plan was approved to renovate much of the space vacated by the Department of Geological Sciences when they moved to their new building. The actual move to Engineering was scheduled for the summer of 1987.

The final major goal was the establishment of closer ties with the remainder of the College of Engineering. While discussions of a joint program had started in 1982 it was not until 1984 that the formulation of a joint program occurred. The program allowed students to obtain two degrees, a four-year BSc in Electrical Engineering and a three-year BSc in Computational Science, in five years of study. Approximately 15 students followed this combined program when it was initiated in September, 1985. It has grown substantially since that time. (In this past year, 1987, approximately 40 students enrolled in the program). The development of a four-year Computer Engineering program within the College has been discussed for m any years; however, lack of resources and tight University budgets have prevented the launching of such a program. In addition to the development of a joint program, significant collaboration was initiated between Department faculty and faculty in the remainder of Engineering through supervision of graduate students and joint research. This collaboration would be enhanced with the move to the Engineering Building.

During the 1981 to 1986 period, a number of significant advances took place in the graduate program and research activities. The Computer Science Research Laboratory was established with the awarding of a $85,000 NSERC Major Equipment Grant in April, 1981 for the purchase of Kimnovax. Financial support for this laboratory was secured for an initial three-year period with the receipt of a $55,000 per year NSERC Infrastructure Grant in April, 1983. A second NSERC Major Equipment Grant for $248,000 was awarded in April, 1984 for the purchase of a Pyramid 90X (Skorpio). The Department's first NSERC Strategic Grant, totaling $180,000 over three years, was awarded in November 1984 to Profs. Sorenson and Tremblay for the DEVIEW Project. The Infrastructure Grant was renewed in April 1985 and increased to $74,000 per year for a three-year period. Many of the new faculty members received research grants and many of the existing grants were increased; the net result was a dramatic increase in research funding as shown in the graph on page 25. Graduate enrolment also increased during this period and the establishment of a PhD program in September of 1985 formed the important cornerstone for many of the new Department research initiatives of the last few years.

Despite the onerous workload placed on Department members through this demanding period of growth, we accomplished much. Special mention must be made of some of these efforts. Rick Bunt did a fabulous job of coordinating the Graduate Program and writing up the successful PhD program proposal. Grant Cheston worked tirelessly at managing the many lists associated with keeping track of enrollment limits and class quotas. Charlie Colbourn is appreciated for his work in the Graduate Program and the research impetus he provided to the entire Department. Dave

Booking and Dan Zlatin expended considerable effort in planning for and coordinating the installation of the many new lab facilities. Our secretaries, Gail Walker and Cindy Feist, gave Herculean efforts in support of an often impatient but generally appreciative faculty. Some of our faculty rose to national and international prominence. Gord McCalla became President of CSCSI and cofounder and co-editor of the NRC-sponsored journal, Computational Intelligence. Paul Sorenson was appointed as a member of the NSERC Computing and Information Science Grant Selection Committee from 1982-85 and chaired the committee in 1984-85. Paul Tremblay and Paul Sorenson produced the second edition of their Data Structures text as well as a major text in Compiler Construction for the McGraw-HiU Series on Computer Science. Winfried Grassmann completed his book on Stochastic Processes with North Holland and became an editor of two prestigious operations research journals.

Several new, active and dedicated faculty were hired and they are already making their contributions known in the University and beyond. They include Jim Carter (1982), Mark Keil and Herb Yang (1983), Derek Eager (1984), Carl McCrosky and Tony Kusalik (1985) and Mostafa Abd-EI-Barr (1986). We are also very grateful for the contributions of those faculty who left during this period, namely Hassan Reghbati (to Simon Fraser in 1983), Charlie and Marlene Colbourn (to Waterloo in 1984) and Dan Zlatin (to Bell-Northern Research in Ottawa in 1984).

Finally, a number of significant accomplishments were made by our students. The Class of 1984-85 organized the first Graduation Banquet and Dance, which since that time has become a very special annual event. Under the leadership and coordination of Rick Bunt, the first U of S team to compete in the ACM Mountain Region Programming Contest finished in second place and won the right to appear in the international finals in New Orleans in March of 1985. The team, consisting of Donna Manegre, Shane McDonald, Berni Schiefer and Carey Williamson, finished 15th out of 24 in this difficult competition. In addition, Carey received the Earl of Bessborough Award as the top Science graduate in 1985 and subsequently went on to Stanford for his PhD Donna Manegre won the Solomon Livergant Prize as the outstanding Commerce graduate. The following year, a team coached by Grant Cheston and Gord McCalla, won the Mountain Regionals and went on to finish 7th overall in the international competition held in Cincinnati. The team, consisting of Roger Blum, Ken Kowaliuk, lrving Reid and Susan Tourigny, finished ahead of such prominent teams as Stanford and UCLA. An outstanding accomplishment! In July of 1985, Joe Wald became the Department's first PhD After receiving a number of offers of employment, he chose to work at Schlumberger-Doll's research lab in Ridgefield, Connecticut.

Personally, I found my term as Department Head very challenging and, for the most part, rewarding. It happened in a period of time that some are already calling the "heydays" of computer science. Excellent students were clamouring to get into our programs and graduates were in very high demand. For the most part, we were able to respond to the demands of more and better students by attracting excellent new faculty and providing adequate new laboratory facilities. By 1986, we were clearly established as a major Department in the University and had developed a national and international profile that was truly remarkable for a faculty size of 14. These positive aspects made the frustrations of budget restrictions that continued to inhibit our growth a little less painful.

[Note: This summary was written for the Department's 20th anniversary celebration in 1988.]

A Department on the Move

1986-1991
Rick Bunt

When I was first approached to take on the job of Department Head it was one of the last things I wanted to do. My teaching and research were going well, and I had no interest in sacrificing these to enter into the administrative arena. After a great deal of persuasion and careful thought I agreed to accept a five-year term, which began, in fact, with a six-month sabbatical leave during which Grant Cheston served as Acting Head. On January 1, 1987, 1 fully assumed the reigns as the fourth Department Head.

The first year of my headship was consumed with our move into the Engineering Building, the first phase of which took place in August of 1987. Plans for this had, of course, begun some time prior to this. A move of this scale, involving people, possessions, and equipment, however carefully planned, does not happen without its challenges. Much of my first year was spent, first, overseeing the construction and furnishing of the new quarters, and then, second, coordinating (with the able assistance of Carl McCrosky) the actual move. The southeast corner of the Engineering Building was to be our first "permanent" home, and so considerable thought and planning went into the configuration of the space. As always the final design represents a series of compromises between our wishes, various physical circumstances, and the over-riding dictates of the architects. The full project was to take place in two phases: phase I being the renovation of existing space to accommodate faculty, staff, and research facilities and phase II (which was scheduled for the mid-1990s) being the renovation of further space to accommodate graduate students and undergraduate computing labs. More on this later.

Our computing facilities were a priority during my headship and continued to evolve in our quest to keep our teaching and research laboratories as near as possible to the elusive "leading edge". Those years saw us move away from centralized mainframe systems towards networks of powerful personal workstations, the first of many on campus. At least in our department the era of the "dumb terminal" was over. Lobbying for the capital funds necessary to maintain high quality labs was an unending task.

We had an External Review in 1988. The review team raved about our department's many achievements and marveled at how much we were able to accomplish with so little. They called on the college/university to provide the additional faculty and staff we required to do what they expected of us, and warned them of our precarious situation: since talented computer scientists were in short supply everywhere the risk of raiding was extreme. The reviewers praised our staff

for their dedication under considerable pressure and congratulated our faculty for their significant research accomplishments in the face of teaching loads much greater than national norms. And they made special mention of the strong collegial spirit for which our department has a national reputation.

Soon thereafter, Paul Sorenson was lured back to Edmonton to take on the headship at the University of Alberta. Properly sensing that this could trigger a mass exodus without a strong show of support for the department, the university presented us with a very special offer — a 3 for 1 replacement for Paul. Armed with three positions we were able to do some serious recruiting that resulted in three excellent appointments: Jim Greer (PhD Texas), Eric Neufeld (PhD Waterloo) and Yan Ke (PhD Johns Hopkins). This brought our faculty complement to 16, up from the 9 we had 10 years earlier but well short of the 21 that our reviewers said we needed. Unfortunately, Yan left us after only one year, but this created a vacancy that was subsequently filled by Carey Williamson (PhD Stanford).

We also saw a number of changes to our support staff. Departures included Darwyn Peachey (to California to become a movie mogul), Roxanne Utley (to Calgary), Jeff White (also to Calgary) and Kelly Wylie (to Ottawa), who were replaced by Alvin Austin, Brian ven der Buhs, Brent Clark and Shane McDonald. We also used some spare cash to hire Tim Brecht (now a faculty member at the University of Waterloo) for a short time before he moved to Toronto to do his PhD Having recently taken over responsibility for our undergraduate laboratories from the Department of Computing Services (DCS, later ITS, and now ICT), we faced no shortage of challenges as we continued to push the technology envelope. We were also significantly expanding our research laboratories thanks to our success in attracting external funds. This was all under the direction of our affable ringmaster, the then-young Dave Bocking. Gail Walker was a source of constant support in the office, and she was assisted, in succession, by Tari Forrest, Cheri Field and Cindy Feist.

Our undergraduate program has always been a point of pride for the department, and some outsiders referred to it as “the best undergraduate program in Canada”. An intense two-year program review culminated in 1988 with the introduction of the first two years of a brand new curriculum. On the advice of our External Reviewers, however, we postponed the introduction of the third and fourth years because we simply didn’t have the resources to offer the classes. With roughly 500 students in our major programs and 1500 students in service classes (which translated into more than 3000 “3-credit-unit-equivalent” course enrollments) we simply had all we could handle. In 1990 the Computer Science Accreditation Council reviewed our undergraduate programs for the first time and gave them their full blessing.

Our graduate program flourished under the energetic stewardship of first Carl McCrosky and then Gord McCalla. We began to attract very strong students to our PhD program (formally approved in 1985) and our MSc program continued to be one of the best anywhere. Our early PhD graduates were getting very good jobs (Shikharesh Majumdar and Sivarama Dandamudi went to faculty positions at Carleton, and Ehab el Mallah went to a faculty position at Alberta), and our MSc graduates were in great demand too. Applications for admission to our graduate program came in at a staggering rate.

Research flourished as well. External research funding exceeded $1M for the first time. About 50% of this funding came from NSERC, but faculty also received funding from the new Networks of Centres of Excellence program, from the Canadian Microelectronics Corporation and from industry. Our faculty also distinguished themselves in service to professional bodies. Derek Eager was elected Treasurer of ACM SIGMETRICS, and he and I "hosted" the annual SIGMETRICS conference in Banff in 1987 (I was General Chair, Derek was Program Chair, and we dragooned Darwyn Peachey and Doug Konkin into helping us out as Finance Chair and Local Arrangements Chair, respectively). John Cooke was elected President of CIPS Saskatoon, Winfried Grassmann and Gord McCalla each served on the editorial boards for three international journals, Tony Kusalik co-organized a Logic Programming Workshop in Israel, and many faculty members served on conference program committees.

Even with these many successes we continued to struggle to be accepted as a full-fledged part of the College of Engineering. Despite persistent efforts we were unable to launch a degree program within the College and little progress was being made in moving our proposals forward. It became clearer to us with every passing year that this was never going to happen, and ultimately this became a significant part of our reason for leaving. We were also severely challenged by increasing demands being made on us all (faculty and staff) with no commensurate increases in resources. Space was an ongoing concern. The targeted completion date for phase II of our move to the Engineering Building drifted further and further away and ultimately never did happen. For the remainder of my headship our undergraduate labs remained in the Arts Building and we were forced to put staff members into graduate student carrels and graduate students into trailers!

In 1988 we had our first reunion in celebration of the department's 20th anniversary. A great time was had by all. We had souvenir mugs, sweatshirts, a commemorative booklet, and wonderful opportunities to mingle with proud alumni.

It was certainly a most interesting experience for me to sit in the Head's office (actually two different Head's offices in two different buildings) and this prepared me well for other roles in the university (in five years I changed jobs four times). Yes, we had our challenges, but the enthusiasm, talent, and sense of common purpose displayed by our faculty, staff, and students offset much of the frustration, and when I see how successful our graduates are in their careers I know we were successful in providing them a rewarding experience. I am extremely proud of what we were all able to accomplish in those years by banding together on a shared mission.

[Note: This summary was written initially for the Department's 20th anniversary celebration in 1988 and then modified for the 35th anniversary celebration in 2003.]

A Time of Crisis and Creativity

1991-1996
Gord McCalla

My time as Head was a time of crisis for the Department, both in terms of budget and in terms of our relations with our own College, the College of Engineering. It was also a time of much creativity and energetic activity on many fronts.

First let me get the two main crises out of the way, and then I can move on to more rewarding stuff. From the outset it was apparent that both budget and our relations with Engineering were going to be concerns during my time as Head. From my inaugural remarks as Head to the Department, printed in Thruput, the Department newsletter, in August 1991, I commented *"Restraint is now a permanent part of the fabric of the University of Saskatchewan"* and that we would have to learn to live with it. I then went on to say

> *"Ten years after joining the College [of Engineering] it is time at last that both the College and the Department perceive Computational Science to be a full fledged Department in the College."*

However, I was confident in our abilities to deal with these problems.

> *"Even so, I am optimistic as I take over as Head of the Department. Lack of resources should not be an excuse for lack of initiative or lack of creativity. We have a vigorous and relatively young faculty. Our research reputation is growing at both the national and international levels. We still continue to teach a wide variety of courses very capably, and are constantly updating and improving our course offerings. Our administrative support is second to none. Although we run one of the biggest and most diverse computer operations on campus, our research and support staff have kept our facilities right up-to-date. Our collegial spirit remains high. These factors, and others, suggest that we can pursue innovative solutions to the problems ahead despite the restraint under which we will be operating."*

Well, we had no idea of how serious these problems would become! By early 1993, "restraint" had become a full fledged blood bath when the University, facing a severe reduction in the government grant, imposed deep cuts across campus. After much discussion within the College, across the board cuts of 11.3% were imposed on every Department. In our Department, with our first faculty retirement some 10 years in the future (the very same John Cooke whose career we are celebrating this weekend), with the smallest administrative support staff in the College, and with nowhere else to turn, we were forced to savage, especially, the laboratory budget. In the end, we cut two thirds (some $80K) of the laboratory support budget, reduced our laboratory support staff by one third (1.5 positions, resulting in one layoff and one resignation), and squeezed the Department marking and administrative support budgets for another $25K, for a grand total reduction of $166,198. This

was a traumatic experience for all concerned, especially for our laboratory staff and for our students who were most directly affected. Only the funds we got from laboratory fees, a generous donation of $50K per year for 5 years from Hewlett Packard (made when we had last renewed our undergraduate laboratory), Dave Bocking's brave leadership, and the Herculean efforts of our remaining laboratory staff, allowed us to pull through, and then begin to recover. Now, only 10 years later, our computer laboratories are in the finest shape they have ever been in.

No sooner had we dealt with the budget crunch than our relations with Engineering took an ominous turn. Ever since joining the College in 1980, we had been trying to get a full-fledged undergraduate program in Engineering. The most recent attempt had been the creation of a Computer Systems Engineering (CSE) program, designed under the guidance of Grant Cheston when he was Acting Head during my first year as Head in 1991-1992 while I was away on sabbatical leave (this is a great way to start a headship, by the way, one I highly recommend). By September of 1992, after broad and detailed consultation throughout the College, this program was put to a vote in front of Engineering Faculty Assembly, and the program was approved – by one vote! Since at least half the votes in favour were from our Department, and a majority of the rest of the Engineering faculty members were opposed to the CSE program, we decided to ask Dean Nikiforuk to chair an "Interim Management Committee" consisting largely of Engineering faculty from other Departments to try to tinker with the program so as to convince the doubters in the College. After several months of meetings, no resolution was yet forthcoming, and then the meetings ceased (we are still waiting for them to resume). This, of course, was disconcerting – if we were to have no program in our own College, why were we there?

More or less at the same time, rumblings within provincial and national Engineering professional organizations suggested that the Engineering profession wanted to expand its scope of practice to incorporate "emerging" areas of practice. In fact, as the 1990s unfolded, it became apparent that the main such "emerging" area was software engineering, so that by 1997 (when once again I was Head, acting at least, while Derek Eager was on sabbatical) a lawsuit had been launched by the Newfoundland professional Engineering association (with the backing of the Canadian Council of Professional Engineers) against Memorial University for putting a software engineering program in a Computer Science department. The lawsuit was never resolved in court and the repercussions are still echoing across Canada – it remains to be seen whether software engineering will become an exclusive area of Engineering practice. But, back in 1993, the attempt to capture software engineering was not yet an explicit goal of the profession. Instead, the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) "merely" wanted to broaden the scope of practice clauses in the Saskatchewan Engineering Act and to weaken the so-called "exclusion" clauses that protected the right to practice of scientists and other related professionals. Our Department, in cooperation with the Science departments on campus and similar units at the University of Regina, in lengthy meetings and other interactions with APEGS (more or less successfully) fought to make sure that the changes were moderated so as not to threaten the right of our graduates to practice. As an unintended side effect of these interactions we came to understand much better what it meant to be a profession, and in particular what it meant to be a professional Engineer. With new clarity, we came to realize that professional Engineering was the philosophical core of the College and that the prime directive for the College was producing graduates who would become professional Engineers. It all fell into place: the reason we couldn't get a program approved was because it wouldn't graduate professional Engineers, and the reason

our Department goals were so often out of synch with the goals of the rest of the College was that, at heart, we had quite different philosophical perspectives. It began to become clear that perhaps we shouldn't actually be in the College of Engineering.

At a retreat on November 19, 1993, the entire Department faculty came to same conclusion. We unanimously decided to leave the College of Engineering. In consultation with Vice President (Academic) Patrick Browne and Dean Atkinson of Arts and Science, it was decided that we should join our major programs in the College of Arts and Science. Naturally, there were many, many memos written by both sides arguing the pros and cons of our administrative move, but on July 1, 1994, our relocation became a reality. Our nomadic Department, after spending its first 12 years in lonely isolation, and then spending an increasingly frustrating 14 years in Engineering, had found a new home. A year later we also had a new name, changing from our unique "Computational Science" moniker to the more generic "Computer Science". Unfortunately, the term "computational science" had by this time become increasingly identified with scientific computing, and was thus misleading for a Department with our scope and mandate.

Looking back now, after nearly another decade has passed, I am convinced that we made the right decision to move to Arts and Science. Our time in Engineering was very productive both for us and for Engineering, and we had (and still have) many research and other interactions with our colleagues there. Even though we are outside of Engineering, we remain ready and willing to cooperate with Engineering in creating new programs involving computing and communications. But in the end, what Engineering fundamentally wanted was for us to become professional Engineers and to teach students to become professional Engineers. We, on the other hand, have a mandate that is campus-wide: to maintain a flexible, dynamic, interdisciplinary perspective that allows linkage with scholars and programs from many intellectual traditions. In fact, as discussed by Blaine Holmlund, John Cooke, Paul Sorenson, and Rick Bunt in their contributions to this Department history, we had vigorously pursued this mandate from our inception and had by the mid-1990s a variety of programs in Arts and Science, a program in Commerce, the "double degree" combined program for Engineering students, a small program with Education, and our graduate programs. In subsequent years, as discussed by Derek Eager and Jim Greer in their contributions, we have continued to try to fulfill these campus wide goals, with a variety of new programs, including a Software Engineering Honours program, a Bioinformatics program with Biochemistry and other life sciences, a new Post Degree Specialization Certificate to allow anybody with a degree in another discipline to acquire deep computer science expertise. Many other proposed interdisciplinary programs, including an e-commerce program (with Commerce), a computational science program (with other science disciplines), a computer engineering program (with Electrical Engineering), and a communications program (with English) were proposed but never funded. Interdisciplinarity is our Department's prime directive, and Arts and Science is the College that best understands what this implies.

Despite the crises brought on by budget cuts and our administrative relocation, the early to mid-1990s was actually a very good time for our research, graduate, and undergraduate programs. Our research dollars stayed high, with funding from a diverse range of external sources including NSERC, the IRIS Network of Centres of Excellence, STEAR, Wurcnet, Canarie, the TeleLearning NCE, IBM, CMC, TR Labs, and HyperCore. Our faculty continued to publish vigorously (research papers, monographs, and text books), and to achieve growing international recognition. During the

period, both Rick Bunt and Derek Eager served on the NSERC Computing and Information Science grant selection committee (Rick chaired the committee for the 1992 competition), and many of our faculty were actively involved in service on conference program committees, journal editorial boards, international standard committees, etc. Our graduate program stayed strong, with typically some 50 MSc students and 15 PhD students in the program at any one time. At the undergraduate level, enrolments moved inexorably upwards from just over 3000 3-cue enrolments at the beginning of the 1990s to over 4000 by the late 1990s. Our students won many honours, as well, including such prestigious awards as the Governor General's Medal (the top graduating student in the University).

Although the budget crunch meant that the Department as a whole could not grow, it was in fact a time of significant personal and professional growth for individual faculty and staff. During my time as Head many of our "relatively young faculty" became full professors. Our two remaining "junior" laboratory support staff members (Alvin Austin and Brian ven der Buhs) had performed highly responsible duties with such superior skill that their positions were re-classified to a higher level. Similarly, our Department secretary, Gail Walker, was performing duties requiring such a high degree of independence, creativity, and skill that her position was re-classified as an administrative assistant position. Our second permanent secretary, Maureen Desjardins, became our "graduate correspondent", the key figure to administering one of the University's biggest graduate programs.

We had some turnover in faculty and staff during this period. A succession of people filled our "soft" funded third secretarial position, including Cheri Field, Lisa Loeffler, and Tammy Morrison, all of whom went on to other positions in the University. On our technical staff, we said farewell to Sharolynn Woodward, who headed off to the great white north (Yellowknife); Tom Hacker, who returned to Michigan; Sue Williamson, who embarked on a career in motherhood; and Beth Millar, who headed west to Edmonton. By the end of my term, Alvin Austin and Brian ven der Buhs were still holding the fort, but they, too, were also to leave for industry within the next little while. On the faculty front, we said goodbye to Yan Ke, who went off to California, and Mostafa Abd-El-Barr, who headed to Saudi Arabia on sabbatical leave and stayed on. Yan's position was filled by Carey Williamson, and Mostafa's by Gina Koehn, in a term position. Gina was later to move over to the staff side and become our first instructional support staff member. In 1994-1995 Carl McCrosky spent a year time sharing his academic position and a position in industry – later the lure of industry was to prove too strong and we lost Carl for good.

My faith in the excellence, collegiality and commonsense of our faculty, staff, and students (expressed in my inaugural Thruput article quoted above) was more than confirmed. Many interesting and creative things happened during my time as Head. To list but a few:

- The Institute for Scientific Information (ISI – the folks responsible for the Science Citation Index) in a study of Canadian university science departments found that our research had the highest impact factor (measured in citations per paper) of any Canadian computer science department over the 5 year period 1990-1994, and second highest (to the University of Toronto) over a 14 year period dating back to 1981.
- In 1995, our undergraduate programming team (Scott Muma, Shawn Hyam, and Reid van Melle, coached by Carey Williamson) finished in the top two of the ACM Mountain Region programming contest, and became one of only four Canadian teams to participate in the

1996 International Programming Competition in Philadelphia (the others being University of Waterloo, Simon Fraser University, and University of Toronto). They eventually earned "honourable mention" at the International contest.

- Professors Paul Tremblay (in 1993) won the Master Teacher Award, the highest teaching honour at the University of Saskatchewan (only two are awarded annually). Later, Jim Greer (in 1997) and Carey Williamson (in 2000) were also to win Master Teacher Awards.
- Carey Williamson taught a graduate networking course not only to our students, but simultaneously to students at the University of Alberta and the University of Calgary. Not so much a teacher as a maestro, he "hosted" the course in one of the University's television studios, and with the help of every audio-visual teaching device ever devised, including an innovative combination of television and ATM computer networking, he was able to interact with his distant learners almost as if they were present. A weekly parade of guests would watch Professor Williamson's performance, including many of the University's senior academic leaders.
- The Department first went on-line during this period, with one of the University's earliest web presences that continues, of course in much enhanced form, today. Of course, the increasing global reach of information technology is double edged, as we found out in February 1995 when somebody who had apparently penetrated our Unix system was then detected trying to do the same to several other computer systems elsewhere in the world. This forced us to shut down our entire Department computing systems for what turned out to be nearly two weeks to try to track down the hacker and re-build our security (the culprit turned out to be one of our students and not to have done as much damage as we had feared). Needless to say, going off-line for two weeks in the heart of the winter term was extremely frustrating for students, faculty, and administrative staff. For our technical staff (Dave Bocking, Brian ven der Buhs, Alvin Austin) and our research technician (Beth Millar), it was a nightmare of detailed investigation and system building that consumed 18 hour days and 7 day weeks.
- The steady stream of planning and budget exercises mandated by the University starting in the late 1980s and proceeding continuously through to today, and our periodic accreditation reviews, meant that we had to produce a long series of comprehensive reports, analyzing in excruciating detail every aspect of the Department. These invariably showed the Department to be performing at very high levels with very few resources. This was good for Department morale, enhanced our image on (and even off) campus, but resulted in no new resources during my time as Head. Resources came eventually, but not until Jim Greer's headship.
- We continued to be involved in a wide range of innovative activities, including SWAPS (Summer Work for Awareness and Promotion of Science), a program started by Jim Greer in the early 1990s in which academically promising high school students worked on information technology projects in the Department in the summer and received a salary. The idea was to attract these students to study science and engineering when they went to University. At its peak we had some 30 students employed both here and at the University of Regina, but eventually the difficulty of cobbling together the "soft funds" from various sources to meet the payroll overwhelmed us and SWAPS faded away.
- Another innovative program was called Target, put on jointly by the western Canadian PhD granting computer science departments, and aimed at attracting the best young computer scientists across Canada to do their graduate work in the West. On a rotating basis, each

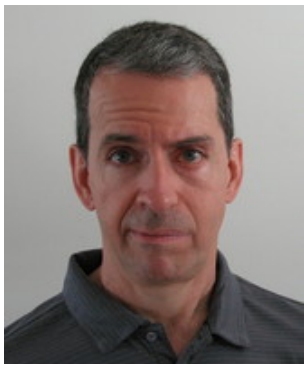
year one of the western departments would host the event. Each department would send their graduate chair to help put on a weekend-long program providing information and activities that illustrated what we had to offer to potential graduate students. Departments across Canada were invited to send their best male and female graduating students to this event, with travel subsidized by Target. After one cycle through the western universities, and with budget crunches in many of the departments, it was decided to abandon Target.

- In a similar vein, the western Canadian computer science departments began to design a collaborative master's degree in software engineering, called WestMOST: the Western Masters of Software Technology. A curriculum was designed, a director hired, and much thought was put into how to distribute the program across the west so that students, many of whom would be working in the IT industry, could access it compatibly with their various locations and duties. The program was actually approved at the University of Alberta, and got to the final stages of approval here and at several other universities, but in the end the market demand simply wasn't there to justify the expense of the program.
- Another bold experiment that didn't pan out was the Saskatchewan Software Technology Centre, a joint effort of the University of Saskatchewan (with our Department leading the way), the University of Regina, the Saskatchewan IT industry, and the provincial and federal governments. The STC was set up in Regina to help the Saskatchewan software industry maintain and upgrade their skills so they could be competitive in the dog-eat-dog IT world. Once again, the lack of market demand, and the ready availability of much commercial IT training, eventually doomed the Centre.
- Perhaps the greatest event during my time as Head was April 1, 1996, the day Paul Tremblay's office disappeared. In fact, what had happened was a closet had been built (possibly by some "semi-midgets"?) around the inside of Paul's office door. When he opened the door to what he thought was his office, all he saw was this closet, including a mop, a bucket, and a copy of Tremblay and Sorenson's data structures book on the shelf. He was heard to mutter "where has it gone?" before the gales of mirth from the hordes of staff, students, and faculty crowded secretly into nearby offices, gave the game away. Several among this crowd were threatened with imminent demise before Paul stalked off into the distance. Rumour has it that there is a video of this landmark in Department history! See Jim Greer's report for a follow up to this event.
- In fact, the disappearing office was just one of the many, many pranks and jokes that helped us to preserve our well known esprit de corps. One year in January and February there was a different diorama every Monday morning in the hallway outside our display case, with memorable stage designs such as the "nut house" (a dollhouse-sized mock up of the Department offices with a different, and often eerily appropriate, nut in each office) and, another time, the outline of dead ruminant behind police tape with bloody footprints leading to Paul Tremblay's door. Throughout the tough times of the 90s, we continued with our annual Christmas shindig (moved to February and re-named the Warm Your Toes party), complete with faculty, staff, and graduate student skits. The Golden Broom curling bonspiel held each March showed graduate students from warmer climes how to walk on ice, and also how to fall, as well as the intricacies of wielding a broom. The annual graduation banquet in March, hosted by the Computer Science Student Society (CSSS), was (and remains) a chance for professors to see how well dressed our students can actually be, and how young their parents are getting. And, we shouldn't forget the annual Fall barbeque to welcome graduate students to the Department, giving the professors a chance to show off

their culinary expertise. The summer soft ball game, which at one time gave the professors a chance to show the students a thing or two about athletic prowess, through the 1990s transformed into a lesson for the professors instead. Our Department collegiality remained strong throughout the difficult times we were facing, just as I had hoped when I took up the Head's reins.

In browsing through my old files as I wrote this article, I was reminded of the incredibly vigorous place this Department was during my time as Head, and how collegial and supportive we were of each other, despite the many crises of the era. The heartening news is that this ambience has been preserved today. There are many new faculty and staff now in the Department, some of the veterans from the mid-90s are gone, Derek Eager and then Jim Greer subsequently took on the Head position, and a totally new cast of students is on stage. Nevertheless, the Department has stayed true to its traditions, still valuing people, still working well beyond the bottom line, still with excellent faculty, staff, and students, and still the best Computer Science Department to be a part of in all of Canada.

[Note: This summary was written for the Department's 35th anniversary celebration in 2003.]



Many New Initiatives, Little New Funding

1996-2000
Derek Eager

From my time as Department Head, one of my strongest memories is the feeling of excitement about the new opportunities that were there before us. The new initiatives that the Department launched during this time period included the Professional Internship program, the Post Degree Specialization Certificate (PDSC), a Software Engineering program, and the initial planning for a Bioinformatics program. We also began planning for our move to the Thorvaldson building, a move that will consolidate the Department with vastly improved and expanded space. At the same time, however, our enrollments were skyrocketing, and we were facing continuing budgetary pressures. Budgetary and enrollment pressures were felt most acutely perhaps in our laboratories, which were kept afloat through lab fees, "creative financing", and the heroic efforts of our laboratory staff. Needless to say, those were interesting times.

It is to the immense credit of the students, staff and faculty of the Department that we able to accomplish so much with so little in the way of available resources. During this period we were sorry to see Alvin Austin, Mostafa Abd-El-Barr, Brian ver der Buhs, Corinne Fasthuber, Jim Fortugno, Carl McCrosky, and Beth Millar, leave their respective staff or faculty positions to pursue opportunities elsewhere, and Gail Walker to go on leave. We were very fortunate to hire into our faculty Ralph Deters, Carl Gutwin (our first Canada Research Chair), Michael Horsch, and Julita Vassileva, and to hire staff members Cary Bernath, Shane Doucette, Linda Gesy (shortly after the end of my time as Head), Gina Koehn, Greg Oster, Seth Shacter, Monisha Shukla, and Jan Thompson.

Although severely resource-constrained, the Department achieved high quality in its endeavours. By the beginning of this period, under Gord McCalla's headship, the Department had made great strides in communicating to the rest of the University the quality of the Department. Substantive additional progress was made as a result of the external review of the Department that was carried out in Spring 1999, in which the reviewers described us as "one of the strongest computer science departments in Canada" and "a model department".

In light of the current downturn in IT, it is easy to wonder whether the excitement is over. Actually, it seems to me that now too, many new opportunities lie before us. I expect the next decades to be incredibly exciting as the IT revolution continues, and as information technology and computer science continues to broaden its impact throughout the University and society.

[Note: This summary was written for the Department's 35th anniversary celebration in 2003.]

Moving into the New Millennium

2000-2003
Jim Greer

As I begin my fourth year as Head of the Department and having recently completed my fourth annual report of Departmental activities, I took a few minutes to look back at what's happened since the dawn of the new millennium. People in the world of information technology faced Y2K with optimism, riding high on the wave of technology and soaring dot com markets. It was hard not to make money day trading and young graduates dreamed of their first IPO or cashing their stock options to buy a yacht.

Given this climate there was little wonder that universities, governments, and especially students were stampeding toward Computer Science, tripping over themselves and others to get in on the action. Already inundated with growing numbers of undergraduate students, and trying to cope with impossible teaching loads, faculty were stretched to their limit and finally others noticed. Through long and arduous struggle, the Department was poised to catch the wave and set its sight on an aggressive growth plan.

Of course growth in Computer Science for Saskatchewan came later than in other provinces, and in more modest proportions, but growth did come. Growth Plan 2000 was funded by the University and the Saskatchewan Government in the spring of 2001. Funding was provided to nearly double the Department's annual budget. This allowed the Department to grow from 18 faculty and 7 staff in 2000 to 27 faculty and 15 staff in 2005. The plan also included the opportunity to recruit up to three Canada Research Chairs as well as a building budget of several million dollars to re-locate the Department into a single building – the Thorvaldson Building.

Still riding the wave of this growth plan, the Department today has filled nearly all of its available positions. The Department has indeed grown. There are many new faces among faculty and staff. Fourteen different faculty members have been hired so far during my headship – some of them for short-term teaching positions, but so far nine into tenure-track positions. Recruitment visits seem to be weekly events, taking up many weekends as faculty recruits are treated to the personal attention for which the Department is famous.

The elusive Thorvaldson project has seen its timelines slip so that it is nearly a year behind the original schedule. With building demolitions, renovations, and temporary spaces, the Department has been increasingly geographically distributed since 2001. We are now spread across four buildings with a full kilometer walk from end to end of the Department. But the Department is gradually finding its way into its new home as facilities gradually open in Thorvaldson, and we hope to be completely moved by the end of 2004.

Our undergraduate programs were recently evaluated through the university's "Systematic Program Review" process. External reviewers examined all aspects of our academic operations. Our BSc programs received an "A" rating – the top score. In fact, Computer Science was one of the few A-rated programs on the entire campus. New specializations have been developed including the honours specialization in software engineering, and the new program in bioinformatics.

The number of Bachelor graduates has grown steadily – from just over 100 in 1999 to nearly 150 in 2002 and 2003. The Department now graduates more students than Physics, Chemistry, Biology, Math and Geology added up. Ours is now one of the biggest programs in the entire College of Arts and Science. In the last couple of years there has been a downward trend in entry-level enrollment and we expect to see the number of graduates falling back to 1999 levels within a few years.

But the real sustained growth has been in the Graduate program. At latest count we are approaching 100 graduate students. The research activity in the Department is expanding and research programs are full of excitement for faculty and graduate students alike. The University's increased emphasis on research intensiveness, combined with active young researchers, fairly plentiful funding for infrastructure through programs like the Canadian Foundation for Innovation, and the new research space afforded through the Thorvaldson project, all contribute to much excitement on the research front. Where once we had a single Computer Science Research Lab, we now have seven distinct specialized research laboratories. Some have long traditions like DISCUS (Networks, Systems and Performance with Bunt, Eager and Makaroff) and ARIES (AI in Education with McCalla, Greer, Vassileva and Cooke). Others are more recent like MADMUC (Multi-Agent and Ubiquitous Computing with Deters and Vassileva), the HCI Lab (Human-Computer Interaction with Gutwin and Subramanian), BIRL (Bioinformatics with Kusalik, Crosby and Daley), IMG (Image Processing, Media and Graphics with Neufeld, Mould, Eramian and Callele), and the SE Lab (Software Engineering with Schneider and Tremblay). Other researchers have individual programs of research in areas including Theory, Operations Research, Scientific Computing, AI, ECommerce, and Parallel Computation.

Our staff complement has grown to assist with the increased numbers of students and the increased research activity. Under Dave Bocking's management are the technical and research staff, who keep our multi-million dollar computing infrastructure alive and well and assist researchers and graduate students with their computing problems. Under Gina Koehn's management are the instructional support staff, who teach and coordinate introductory courses and develop software to make our teaching more effective. Monisha Shukla manages the internship program and acts as our development officer and professional organizer of all things. Several research project staff call the Department home but are paid through research projects and work in the various research labs. The four office staff – Maureen Desjardins, Linda Gesy, Jan Thompson and Heather Webb – keep the whole Department functioning while trying to keep JP and everybody else in line.

Always high on the Department's priority list is FUN. Many traditions have grown up over the years and I'm pleased to say that many persist until today. The Golden Broom curling bonspiel still happens every March as graduate students from warmer climates learn how to run, slide, sweep and fall with varying degrees of grace and skill. The vision still remains of one young lad who lost his balance because of his own shivering! The annual Christmas party, now dubbed the "Warm Yer Toes" Party and held in early February (Gord McCalla proclaims it a sensible time for a Christmas party), is a gala event involving dinner and 'dramatic' performances. The skits have been incredible

in the past three years – from Frodo to Shrek to the Dung Monster of Animal Science. The welcome back barbeque in September is a chance for professors to burn burgers for their graduate students, and the annual summer day of games in the park is sometimes instantiated as a softball grudge match and other times cricket or soccer or other games for the young at heart.

And of course there are pranks (funny how most of them involve JP Tremblay). The best of the new millennium was the April 1st prank when JP's office door became the entry into a classical rustic outhouse – a traditional one-holer – with a textbook serving as emergency paper when the tp roll ran out. The moment of discovery was precious, and when the janitor asked me with great seriousnes and concern if he was supposed to empty the honey pail, howls of laughter filled the building.

A better place to work I could not imagine. The people are genuine, friendly, collegial and hard working. The climate in Saskatchewan is indeed warm and the future is bright.

[Note: This summary was written at the time of the Department's 35th anniversary celebration in 2003. Jim served as Department Head for 2 more years, finishing his term on June 30, 2005.]

Computer Science Evolves

2005 – 2008
Kevin Schneider

At the beginning of my headship the Department had only just recently moved into our new home in the Thorvaldson building, connecting us more directly to the other sciences and to the College of Arts and Science. This was a welcome move as it provided us with state-of-the-art undergraduate labs, provided additional research lab and graduate student space, and connected us more centrally to the university. We continued to grow, both in student numbers and in faculty numbers. During my headship we recruited and appointed three new faculty members: Regan Mandryk, Nate Osgood and Kevin Stanley. The discipline was changing and so was the Deaprtment. The relevance of computer science in everyday society was becoming more recognized, in part due to the launch of the iPhone in 2007 as well as numerous game consoles (Xbox 360, Playstation 3, Nintendo Wii), which in turn influenced our course offerings and research around smart phones and computer gaming. The Department continued its strong commitment to students and research, and to building a foundation in order to establish itself as the premier department at the U of S.

The Times They Are A'Changin'

2008-2017
Eric Neufeld

A founding statement of Blaine Holmlund, the first Head of the Department, went as follows.

> *"Computational Science is not only the design of computing devices, nor is it just the art of numerical computation, important as these topics may be. Computational Science is the art of collecting, transmitting, storing, manipulating and representing information. It is primarily concerned with the body of knowledge needed to understand and participate in the design, development and application of systems for handling information in the most effects manner. All forms of information – numeric, algebraic, verbal, visual, graphic are of interest to computational science."*

This visionary statement back in the 1960s set the young unit (then called Computational Science) in a research direction at a time when departments elsewhere were being founded mainly to train technologists at the university and in the fledgling data processing industry. However, the department struggled to gain traction with the institution for its research mission. Nonetheless, individual faculty aggressively pursued scholarly activities, as others have documented, and these were widely recognized.

A major change occurred during the headship of Jim Greer. The department got its own building, the Spinks addition housed our new lab, and the faculty complement grew. Professor Greer's lobbying was assisted by the surge of interest in the possibilities offered by the Internet.

Then came then dot-com bust and the high-tech meltdown, which together created a large drop in student interest. The department became a target for cuts in the eyes of many. It was at this point that I became head of the department. I quickly found out this wasn't only a Saskatchewan problem – department chairs all over North America were sharing their pain at national meetings.

During the first couple of years of my headship, the department was hit by a related double whammy. The same institution that, during the time we were growing, had strongly argued for decades to make it a priority to preserve historical funding levels to academic units, a basic principle of a liberal arts education, changed philosophy and began to shift towards a funding mechanism based on enrolments and research funding.

Meanwhile, NSERC, the national research agency, changed its funding mechanism. Historically, it had given much support to basic curiosity-driven research, which treated fairly those departments not close to the industrial heartland of the country. Overnight, it shifted towards supporting researchers with large teams of collaborators and strong industrial connections, which initially hit the department hard. At that point, few Saskatchewan companies were interested in investing in computer science research, and faculty had to work hard to maintain research funding.

For the historical record, in the middle of all this the University suffered a leadership crisis. Things have settled down, and there is no need for rehashing, but it made it an interesting time to be chairing a department in this environment.

We had many personnel changes during this period. Among our technical staff, we lost Gus van de Velde, Shane Durant, David Bocking, and Seth Schacter. Colleen Hansen moved to ICT, and Ken Sailor left for other ventures, while Raouf Ajami joined us and Merlin Hansen retired. There were many changes to the office staff also. Nicole Staveness, who coordinated internship, left for industry and was replaced by Shakiba Jalal, who also took on outreach. Long-serving office staff Maureen Desjardins, Linda Gesy, and Jan Thomson chose retirement, and were replaced by Shakiba Jalal, Sophie Findlay and Gwen Lancaster. Sophie moved into Gwen's position recently and was replaced by Danielle Siemens. Dan Neilson was hired for instructional support, and replaced with Jeffrey Long when Dan moved to IBM in Toronto. Amongst faculty, Chanchal Roy was one of the first hires of this period. David Mould left for Carleton, and was replaced briefly by Ted Kim, and shortly afterwards by Ian Stavness. For much of this period Kevin Schneider was seconded to a series of positions in senior administration.

Even at that point of low enrolments and net loss of staff, signs of another coming boom were in sight. The modern smartphone made its debut, social media and streaming began to flourish, and expectations of consumers for professional-looking and secure websites continued to grow.

Ever resourceful, faculty used the low point of undergraduate enrolments to concentrate on graduate student training. At the retirement of former Graduate Secretary Jan Thomson, our graduate program consisted of about 100 students. New research sources arose (PIMS and MITACS) offering matching funding for industrial collaborations, which faculty used to form relationships with new local firms looking to provide key players with modern websites that could be viewed on all form factors. The Department maintained a strong national and local presence in promoting its expertise. Continuing commodification of computing made design and security more important as computers disrupted the most basic economic institutions in society – banking, telephones, media, shopping. The importance of design affected our undergraduate program. Locally, Saskatchewan enjoyed an unprecedented boom that was even reported in *The Economist*, which had a ratchet effect on the new breed of emergent high-tech firms. Industry began lobbying the university and the government for increased support for computer science.

Everything turned out well. The annual number of graduates (BSc, MSc and PhD) approximately doubled over this period, total research funding increased substantially, and after protracted lobbying we received approval for some new positions, including a Canada Research Chair in Computer Security.

The Newest Head

2017-present
Kevin Stanley

I have the distinction of being the first department head who is younger than the department, and have the fortunate opportunity to only be required to write about a little over a year (July 2017 to August 2018). But what a year! If there is a narrative that encapsulates the department over the last year, it is one of growth: growth in undergraduate and graduate numbers; growth in research funding and funding sources; and growth in profile within the university and around the world. There is also a narrative of change; of long term employees leaving, of new research stars rising, and of the perception of senior administration about the place of computer science within the university and society altering. This growth and change has created an ambiance of potential and action within the department, but has also made my job harder (and more rewarding) than I initially expected. Over the past year, all my problems have been good ones – I just sometimes wish I had fewer of them.

2017 was the year that the size of the undergraduate program became larger than the department could reasonably handle. Since the collapse of enrolments following the dot-com bubble, the department has been growing at a reasonably steady clip of 10-20% per year. As is often the case with compound interest, in the early days, it didn't look like much. By 2015-2016 numbers had recovered and some upper year courses were feeling the strain. In 2017, most of the core third year classes overflowed the allocated classrooms, had waiting lists with dozens of names, and generally caused Heather Webb substantial headaches. Thanks to the hard work of all our staff and faculty (including Chanchal Roy who taught a 120-person CMPT370 class in Quance Theatre), we pulled through.

Thanks in part to the research investment from the two CFREFs (water and plants), the SWaGUR CREATE, and a variety of tri-council and external grants, and in part to the ambition of our faculty members, the computer science graduate program grew to be the largest thesis-based program on campus. The department has been full of engaged graduate students from around the world tackling problems anchored in computer science. With an average of 6-7 graduate students per faculty member, Sophie Findlay has been kept on her toes in her first year as Graduate Program Assistant.

The increase in graduate students has predictably led to an increase in research output, but 2018 was a year in which three of our faculty were recognized for excellent work throughout their careers. Carl Gutwin was recognized at convocation as a Distinguished Researcher, Chanchal Roy received two awards from the Software Engineering community for the impact of his work, and Regan Mandryk became the first Staecie Award winner from the University of Saskatchewan in a quarter century. With the continuing research excellence and productivity of the department, I expect more research awards will follow.

Members of the department were recognized not only for research excellence. Regan Mandryk won the graduate supervision award and Jeff Long received the USSU teaching award, showing that the department has excellence in the teacher-scholar model at all levels of instruction. Staff and faculty were not the only award winners. Francois Roewer-Despres, a computer science undergraduate, won the Haslam, Bessborough and Governor General's Silver Medal at the Spring Convocation. There has never been a year quite like 2018 for the department, but I hope to see the likes of it again.

Against this growth was a substantial turnover of staff. The CUPE main office staff were absorbed into the ASG, causing temporary ripples of confusion. Early retirement beckoned for Merlin Hansen and Gwen Lancaster and Seth Shacter moved on as well. Brittany Melnyk took a leadership position at Noodlecake. Danielle Siemens entered law enforcement. As a result of these changes, Ellen Redlick and Smit Choksi joined the department, Sophie became Graduate Program Assistant and a new hire yet to be named will be joining the front office. The faculty welcomed Debajyoti Mondal and Natalia Stakhanova, but tragically lost Jim Greer, just months before retirement.

2017 also marked the first functional year of SaskTech, a group of local technology companies formed, in part, to represent the interests of industry to the government. SaskTech has been an excellent partner for the department, providing a sounding board for curricular changes, providing guidance on industry direction, and critically lobbying the university and government to increase investment in computer science. Our narrative of growth and the help of SaskTech has led to significant investment from the college and university levels. We will be hiring four new faculty positions this fall, bringing the total increase in faculty complement over the last two years to six, one of the largest short-term increases in size in the history of the department.

For me, the year culminated in a three-day retreat at Wanuskewin. I am privileged to work with such dedicated and collegial staff and faculty. The retreat started with the Dean and the Provost providing overviews of their vision for the university and computer science's place in it. The short version was "Computer Science has an important place in the university and college vision." Over the course of the week significant decisions were made about the structure of the undergraduate and graduate programs, the departmental vision, and potentially contentious issues such as standards for tenure and promotion, and guidelines for assignment of duties.

With growth and change come opportunity. This opportunity has been partially realized with the growth of the faculty, but bringing in new people is just the beginning. Early in my academic career a mentor told me "Ideas are easy, execution is hard." It will be incumbent upon us over the next five years to execute on the opportunities that growth and change have presented us: to build an undergraduate program that produces viable, valuable graduates; to mentor new graduate students to become the next generation of researchers; to continue to grow and build our research profile to impact the university, community and world; and to preserve the professionalism and collegiality that allow us to succeed.

This past year has been quite the ride, but the future looks even more interesting.

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