

*Honouring  
those who  
influenced the  
history of  
computing in  
Canada*

*October 19, 2005*



IBM Centers for Advanced Studies



# Pioneers of Computing in Canada

## The abstract

In May 2004, an inspiration occurred to Dr. Hausi Müller of the University of Victoria, when he was attending a conference, ICSE 2004, in Edinburgh, Scotland.

In speaking with a variety of people during the conference, he came to the realization that very few students were aware of the achievements of those who were directly responsible for developing and nurturing computer science research and education programs at Canadian universities. Dr. Müller decided to do something about this lack of awareness, and so approached a couple of IBMers at the conference, who happened to manage an annual conference called CASCON, sponsored by the IBM Toronto Lab. Dr. Müller has been associated with CASCON since its beginnings in 1990, and it holds a special place in his heart. What better venue to celebrate the Pioneers of Computing in Canada than at CASCON!

Of course, he thought all the planning and execution of such a major undertaking could be done in four months, at CASCON 2004. The reality of what had to happen to make the event possible was reflected in the panic-stricken face of CASCON's project manager. The event was then rescheduled to take place at CASCON 2005.

Months of conference calls, communications by phone and email, networking to find Pioneers, all resulted in what we are now gathered to enjoy.

## Acknowledgments

Dr. Hausi Müller, University of Victoria

Dr. Kelly Lyons, IBM Center for Advanced Studies

Cheryl Morris, IBM Center for Advanced Studies

Stephen Perelgut, IBM Center for Advanced Studies

Marnie Goldlust, IBM Center for Advanced Studies

Students of Ursula Franklin Academy, Toronto

Communication and Information Technology Ontario (CITO) a division of OCE, Inc.

The nominating committee:

- Dr. Don Cowan, University of Waterloo;
- Dr. Morven Gentleman, Dalhousie University,
- Dr. John Mylopoulos, University of Toronto;
- Dr. Pierre Robillard, École Polytechnique, Montréal;
- Dr. Gabby Silberman, formerly worldwide IBM Center for Advanced Studies, now Senior Vice President, Computer Associates (CA) Research Labs
- Dr. Paul Sorenson, University of Alberta.



# Pioneers of Computing in Canada

## The criteria

They have been involved in almost every aspect of computing science, from founding university computer science departments in the 1960s and 70s, to winning many national and international awards, and contributing to pioneering research in computer architecture, computational mathematics, theory of computing, programming languages, algorithms, data structures, operating systems, artificial intelligence, networks, software engineering, and human computer interaction.

"Many innovative technology companies call Canada home and Canadian universities continue to graduate topnotch computer scientists who are in demand here and around the world," said Dr. Kelly Lyons, Director, IBM Center of Advanced Studies (CAS), Toronto. "By honouring these Pioneers, we're also acknowledging the extraordinary impact they have had on the evolution of the Canadian computing industry over the last 50 years. We want to ensure that these Pioneers' place in Canadian computer science history is recognized and documented, so that young people will be inspired to follow in their footsteps."

Honourees were chosen on the following criteria:

- Being an academic pioneer, and having spent a substantial part of their career at a Canadian University, contributing significantly to computing science education and research
- Having received a PhD degree in 1972 or earlier

A complete list of those selected appears on the following page.

Note: Much effort was made to gather names and contact information of potential honourees. We apologize for any names unintentionally omitted.

# Pioneers of Computing in Canada

## List of honourees

Armstrong, William	Gagne, Simon	Lehman, Alfred	Shepard, Terry
Arnason, Neil	Gentlemen, Morven	Levison, Michael	Simpson, Bruce
Baecker, Ronald	Georganas, Nicholas	Linders, James	Smillie, Keith
Banerji, Dilip K.	George, Alan	Lustman, Francois	Stanton, Ralph
Barrodale, Ian	Gilmore, Paul	MacEwen, Glenn	Sterling, Theodor D.
Birtwistle, Graham	Gotlieb, Calvin	Manning, Eric	Stewart, Neil
Borodin, Allan	Grassmann, Winfried	Marsland, T.A. (Tony)	Symes, Larry
Brzozowski, John	Grundke, Ernst	Munro, Ian	Tartar, John
Burkowski, Forbes	Hamacher, Carl	Muzio, Jon	Toussaint, Godfried
Cabay, Stan	Harrop, Ronald	Mylopoulos, John	Tremblay, Jean-Paul
Calvert, Thomas	Holmlund, Blaine	Newborn, Monty	Unger, Brian
Cook, Stephen	Holt, Richard	Olesky, Dale	van Emden, Maarten
Cooke, John	Horton, Joseph	Oppacher, Franz	Varah, James
Corneil, Derek	Hume, Patterson	Ören, Tuncer	Vaucher, Jean
Cowan, Don	Jardine, Donald	Pelletier, Francis Jeffrey	von Bochmann, Gregor
Custeau, Guy	Jenkins, Mike	Riordan, Denis	Vranesic, Zvonko
Davis, Wayne	Kameda, Tiko	Roberts, Frank	Walsh, Timothy
Dirksen, Paul	Kavanagh, Robert	Roosen-Runge, Peter	Wasson, Dana
Edmonds, Jack	Kendall, John	Rosenberg, Richard	Weinkam, James J.
Ehle, Byron	King, Peter	Ryan, Patrick	Williams, Michael
Enright, Wayne	Lauer, Peter	Sankoff, David	Williams, Hugh C.
Ferland, Jacques	Lawson, Doug	Sevcik, Ken	Wilson, Tom
Florian, Michael			Woodside, Murray

## Major Achievements:

- When he first got into computing in 1967, he wrote a FORTRAN program that was supposed to illustrate “Pavlovian” learning
- At the IFIP '74 session in Stockholm, he presented a paper on what is now called "Armstrong's Axioms" for functional dependencies
- He still works in the field of “machine learning,” and helps companies apply it to statistical problems in forecasting electrical power demand, power produced by wind turbines, distribution of natural gas, and energy from atomic fusion

## Memorable Experiences:

- IBM played an important role in my career. It was Edgar F. Codd of IBM who conceived the idea of a relational database. His early papers got me interested in database management.
- With the release of DB2 in 1981, the relational model was well on its way to the dominant place it holds today...In a sense, a mathematical theory of relations had triumphed in the database field.
- During a visit to the IBM San Jose labs in 1979, I learned that the precursor of DB2 was performing extremely well in comparison to other database management systems
- Ron Fagin of IBM took the 1974 paper (i.e. "Armstrong's Axioms"), which one reviewer said was "too theoretical to be of any practical consequence," and showed it was connected to logic in a way that got Theoreticians all over the globe interested in it!



### Words of Wisdom:

*During my university studies, I sometimes expressed the opinion that this or that branch of mathematics was "useless." Whenever I have labelled a branch of mathematics "useless," I was always wrong!*

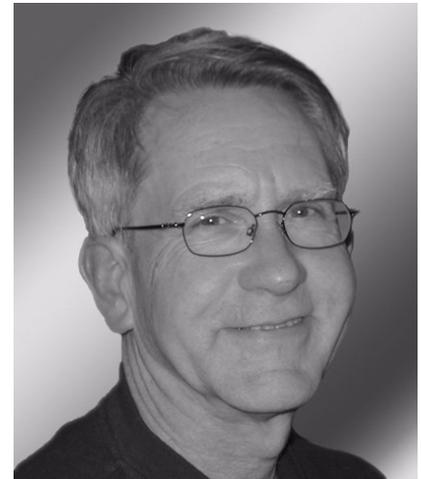
## Major Achievements:

- The development of analysis methods and computer software for estimation of animal populations: their abundance, survival, recruitment and migration rates.
- Methods and software developed by him, his students and colleagues, have been used to better understand the dynamics and optimal management of migratory fish and birds and marine and terrestrial mammals
- Recognized with a Professional Statistician Award from the Statistics and Actuarial Science Department at Simon Fraser University
- Past President of the Biostatistics Section for the Statistical Society of Canada
- Wrote and co-wrote 5 books and 5 refereed journals

## Memorable Experiences:

I am a statistician who happened to join and find a niche in a Computer Science department.

- I have watched the discipline develop from a narrow field, practiced largely by self-taught mathematicians and engineers, to a rich and deep subject with its own diverse theory, methods and applications, and practiced by well-trained professionals.
- This has occurred because of the need to deliver solutions to complex problems in data organisations, communications, analysis, prediction and management, and because of the creativity of the computer science community in evolving to meet these needs.
- It has been fascinating to observe the flowering of this young and dynamic discipline!

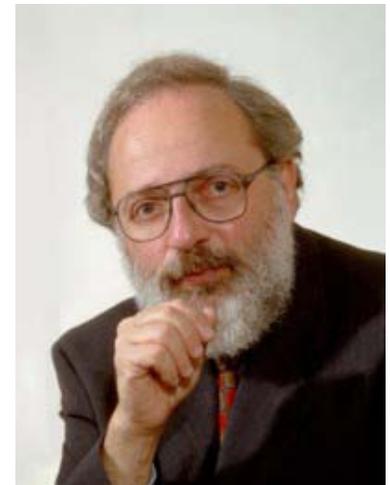


### Words of Wisdom:

*For me, interdisciplinary work, combining statistics and ecology with computer science, has led to many exciting research collaborations and consulting opportunities. Whether it is finance or genomics, knowing the vocabulary and paradigms of another discipline can open many doors!*

## Major Achievements:

- Professor of Computer Science, Bell University Laboratories
- Chair in Human-Computer Interaction
- Founder and Chief Scientist of the Knowledge Media Design Institute at the University of Toronto
- Affiliate Scientist with the Kunin-Lunenfeld Applied Research Unit of the Baycrest Centre for Geriatric Care
- Principal Investigator of the Canada-wide NSERC Network for Effective Collaboration Technologies through Advanced Research (NECTAR)
- Named one of the 60 Pioneers of Computer Graphics by ACM SIGGRAPH
- In May 2005, he received the Canadian Human Computer Communications Society Achievement Award
- Published over 100 papers and articles, is author or co-author of 4 books and co-holder of 2 patents, and has founded and run 2 software companies
- Current entrepreneurial venture is a virtual non-profit foundation within the University of Toronto to distribute and support the open source ePresence Interactive Media webcasting and archiving system

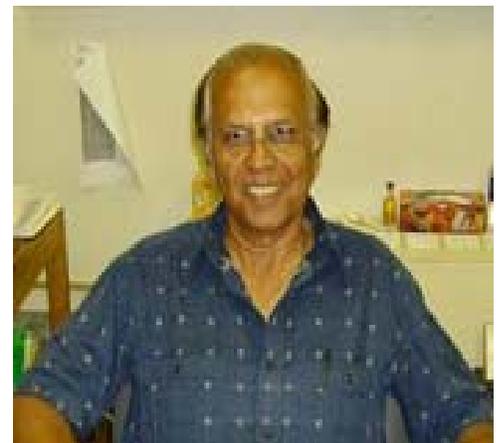


## Major Achievements:

- Worked for Bell-Northern Research in Bramalea, Ontario, at the University of Ottawa, and at the University of Guelph
- His early work on computer arithmetic and microprogramming became textbook material in the 1980s
- His work on microelectronics CAD has been adapted in industry, especially, regarding interconnect minimization during high-level synthesis of chips
- His work on high-level synthesis and design reuse had no industrial takers in the late 1980s and early 1990s, but has now become a standard part of toolsets from vendors like Cadence, Mentor Graphics, etc.

## Memorable Experience:

- My most memorable experiences are from the year 2002 when two of my former graduate students turned multi-millionaires after selling their respective IT companies they had founded in late 1990s (one in Toronto, the other in Austin).



### Words of Wisdom:

*It is good, once in a while, to leave the familiar trail and wander into the forest. You might discover something new and exciting!*

## Major Achievements:

- Instrumental in adapting the Curriculum '68 recommendations of the Association for Computing Machinery (ACM) for use at the University of Victoria
- In the early 1980s, he became the first President of the Software Industry Development Association (SIDA), and was invited to speak about high tech opportunities for British Columbia to Premier Bennett's Cabinet
- More than 450 projects have been successfully completed at Barrodale Computing Services Ltd. (BCS) since 1978, with clients ranging from Federal, Provincial and State Government departments in Canada and the USA, to multinational and smaller corporations worldwide.

## Memorable Experience:

The ACM Curriculum '68 report was superseded by a much more comprehensive Curriculum '78, which had a substantial impact on Computer Science education in North America:

- The University of Victoria decided, partly in support of its case for a future Faculty of Engineering, that the time had come to launch a separate Department of Computer Science. I became the Founding Chair in 1980
- I returned to the University of Victoria in 1967 and encouraged other PhD graduates to form a Computer Science group within the Mathematics Department



### Words of Wisdom:

*Problem solving requires clear logical thought, and the ability to pose the right questions in precise terms. Also, the ability to recall and apply experience gained with previous technical tasks is an asset, since many technical problems that arise in practice are variations on problems that have already been solved. The ability to recall and apply experience gained with previous technical tasks is an asset, since many technical problems that arise in practice are variations of problems that have already been solved!*

### Famous Quote:

“One of the most important attitudes for a programmer to develop is that of ‘owning’ a problem, and sticking with it until all reasonable approaches to its solution have been pursued.”

## Major Achievements:

- Chair of the Computer Science Department at the University of Toronto from 1980-1985, and was Acting Chair from 1992-1993
- Held several visiting positions, namely at Cornell (1975), ETH Zurich (1976), Universite de Nice (1983), Hebrew University (1985-6 and 1994), MIT (1993), Weizmann Institute (1994), and the Technion (200)
- Was a Lady Davis Fellow at the Hebrew University and the Technion and a Varon Visiting Professor at the Weizmann
- Published papers in the areas of queuing theory and network routing, data structures, distributed computing, and information retrieval
- Co-author of three textbooks: "Social Issues in Computing" with C.C. Gotlieb, Academic Press, May 1973; "Computational Complexity of Algebraic and Numeric Problems" with I. Munro, American Elsevier, May 1975; "Online Computation and Competitive Analysis" with R. El-Yaniv, Cambridge University Press, May 1998
- Published over 40 journal papers and 11 conference papers (not counting those that later became journal publications)



## Major Achievements:

- The outstanding students with whom he was fortunate to work with (two of whom - Wayne Davis and Dilip Banerji- are being recognized as Pioneers in Computing as well)
- Served as Chair of the Computer Science Department in the periods of 1978-1983 and 1987-1989
- Co-authored "Digital Networks," Prentice-Hall, 1978, with Michael Yoeli, and "Asynchronous Circuits," Springer, 1995, with Carl Seger

## Memorable Experiences:

- 1978-1983 and 1987-1989: These years, as I was the Chair of the Computer Science Department, were particularly challenging for Computer Science. Enrolments were increasing dramatically every year, and there were very few PhDs produced in CS. Consequently, recruiting was a constant activity, and trying to cover the required courses with the available faculty was a real juggling act. In spite of that, at the end of my first chairmanship, our department grew to 40 faculty members, which was very large at the time.
- My sabbaticals and other leaves away from Ottawa and Waterloo were most enjoyable:  
University of California, Berkeley (1965-1966),  
University of Rome (Winter 1972),  
University of Paris (1974-1975),  
University of Sao Paulo (Fall 1983),  
Kyoto University (Winter 1984),  
and Eindhoven University (1989-1990).  
I always took advantage of the opportunity to learn a new language (including Californian) and to sample some local wine or sake!



### Famous Quote:

“Avoid categorizing research work as 'theory,' vs. 'application,' or 'implementation.' Any serious look at any unsolved problem will benefit from a sound theoretical analysis, and a good theoretical result will be usually followed by interesting applications.”

### Words of Wisdom:

*To researchers in general - Work on a problem that fascinates you, and not on one that will just bring you a higher salary or a larger grant. Do not avoid difficult problems; to solve a hard problem you need to become obsessed by it!*

## Major Achievements:

- Associate Professor in the Computer Science Department at the University of Waterloo
- Developed text retrieval systems in both the research and commercial sectors
- While on sabbatical in 1992, he worked as a Chief Scientist in Text Retrieval for System House Ltd.
- He worked at Dow Jones and Company evaluating software and hardware configurations for their future SuperText news retrieval service
- Over the last seven years, he has helped develop the Bioinformatics program at the University of Waterloo

## Memorable Experiences:

In the early 1970's, the University of Manitoba upgraded the memory of their mainframe computer:

- After delivery of the upgrade unit, it stood looming in the hallway awaiting installation...It was approximately the size of a kitchen refrigerator and many of the CS students came by to marvel at it, some touching it as if to get a little “contact high”
- There was a certain excited anticipation with this: “imagine the wonderful programs that we could now write because the mainframe had a whole extra megabyte of storage!”

I remember having six grad students move a hard drive off a wooden palette after it was delivered to my lab in 1982. I was very anxious that someone might get seriously hurt, because the drive weighed over 500 pounds. The storage capacity was 80 megabytes (1/1000 of the 80 GB currently placed in laptop computers).



### Famous Quote:

“With the advent of purposeful gene manipulation, new algorithms for drug design, support for molecular libraries and databases, and many other advances, we are starting the next great wave of discovery and progress with even more significant impact: modifying and/or controlling life processes that were well beyond our reach a few decades ago”

### Words of Wisdom:

*Our first TV in 1953 was a marvel for my parents, but just another “neat thing” for me. You have to live through the changes, and then reach back in your mind, so that with the benefit of nostalgia, you can really appreciate current advances!*

## Major Achievements:

- At Simon Fraser, he served terms as Chair of Kinesiology, Dean of Interdisciplinary Studies, Director of Engineering, VP Research and Information Systems, and Director of the School of Interactive Arts and Technology
- At Technical University of BC, he served as VP for Research and External Affairs
- 2002-2005: He led the initial development of SFU's new School of Interactive Arts and Technology

## Memorable Experiences:

- 1974-1985: Helped to grow an interdisciplinary Computing Science program at Simon Fraser University (with Sterling, Weinkam, Cercone, et al)
- 1979-1983: Led development of Engineering Science at Simon Fraser University
- 1980-2005: Developed and commercialized the Life Forms software for human figure animation and dance choreography. Founded Credo Interactive Inc.
- 1995-2002: Co-founded the TeleLearning Network of Centres of Excellence
- 1997-2002: Led the development of an Information Technology degree program at the Technical University of BC



### Famous Quote:

*“Computer science is a truly interdisciplinary field. Some are upset that almost every other discipline is appropriating CS tools and methodology - but this is a true measure of value and success.”*

### Words of Wisdom:

*In the future, computation will grow as a component of essentially everything we study, build and do. This is a heavy responsibility for future computer scientists!*

## Major Achievements:

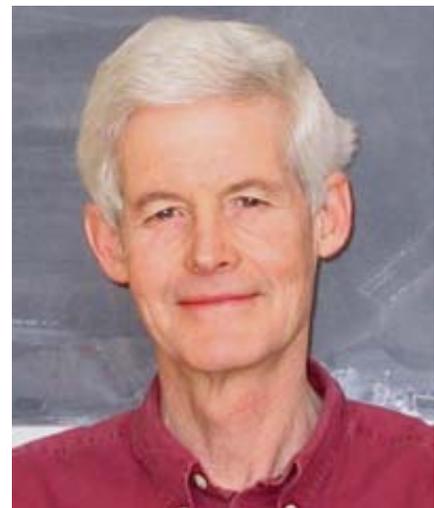
- His best known paper, "The Complexity of Theorem Proving Procedures," presented at the 1971 STOC conference....This paper introduced the theory of NP-completeness and proved that the Boolean satisfiability problem is NP-complete
- He is the 1982 recipient of the Turing Award, and was awarded a Steacie Fellowship in 1977 and a Killam Research Fellowship in 1982
- He is a fellow of the Royal Society of Canada, and the Royal Society of London, and a member of the National Academy of Sciences (United States)
- 25 students have completed their PhD degrees under his supervision, and many of them now have prominent academic careers of their own

## Memorable Experience:

- Programming the IBM 650 as a freshman at the University of Michigan in 1957, to verify Goldbach's Conjecture

## Moment of Truth:

- The idea of NP-completeness for Boolean satisfiability was inspired by work of my Harvard thesis advisor, Hao Wang. Wang and his colleagues were extending Turing's famous reduction of the predicate calculus satisfiability problem to Turing machine computations.



## Major Achievements:

- Involved in the formation of what is now the Department of Computer Science at the University of Saskatchewan in 1968, where he also served as its Head from 1974 to 1981
- For many years, taught a software engineering project class that stressed the human aspects of team work and the impossibility of precisely defining and meeting the ever-changing requirements of a diverse group of users
- Served as the President of the Saskatoon section of the Canadian Information Processing Society

## Memorable Experiences:

Highlights of 1968-1981 involved fighting (and often losing) various battles; some for resources, others against those who did not recognize the changes that were occurring in the computing infrastructure:

- Fighting against the concept, common in the early 1970s, that all computing should be provided through centralized mainframes in a manner similar to the distribution of electricity. This was a particular problem in Saskatchewan with the creation of a Crown Corporation (SaskComp) mandated to provide all computing needs to government funded bodies on a monopolistic basis.
- Promoting the view that the general-purpose PC would become the vehicle by which word processing would be done, and that keyboarding would be done by all rather than by specialized secretaries. Amazingly, this was considered heretical in the early 1980s!



### Famous Quote:

“Many years ago, I described my views and interests privately to one of the most distinguished computer scientists ever to exist. He said “Ah, a soft computer scientist!” I am pleased to acknowledge that he was right, and suggest that our discipline needs more 'soft computer scientists' if it is to prosper”

### Words of Wisdom:

*Beware of narrow technical specialization - the fundamentals of computer science have been stable for many years, and will continue to be so; they enable whatever is the current hot technology to be learned and understood, and then discard them when they are no longer relevant!*

## Major Achievements:

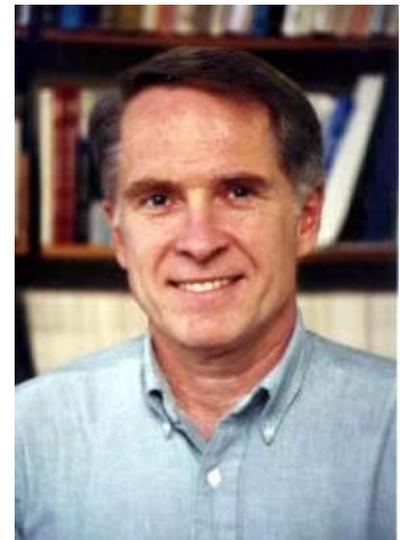
- He has held various administrative positions at the University of Toronto, including Chair of a Department
- He is cross-listed in the Department of Mathematics and has had visiting professorial positions at the University of British Columbia, Simon Fraser University, the Universite de Grenoble, and the Universite de Montpellier
- He has won 2 CSSU Teaching Awards and has supervised over 50 MSc and PhD theses
- Was instrumental in the founding of ITRC and establishing both the Fields Institute and the Bell Canada University Labs at U of T
- Author or co-author of over 100 research publications
- Currently serves on 3 editorial boards

## Moment of Truth:

- Starting with ITRC, he was quite involved in establishing meaningful research communication between industry and academia. Very early on he realized that in this area, "industry" is not a singular noun and that there is as much difference of opinion in industrial perceptions as there are in academia.

### Words of Wisdom:

*In the 1960s and '70s, Computer Science had to fight quite a battle to be taken seriously as a legitimate academic discipline. The fences were up and very often the attitude was that we "didn't quite fit" within the established structures. I am concerned that too often we currently take the same stance in responding to new possible areas of Computer Science. For the discipline to continue to flourish, we must be willing to embrace new exciting interdisciplinary areas!*



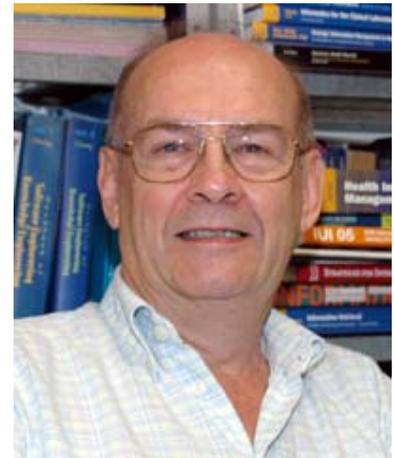
## Major Achievements:

- Founding and helping to build the Computer Science Department at the University of Waterloo
- Helping to start and run WATCOM, the first successful University of Waterloo spin-off company
- Working as part of a team on some of the software systems that first put the University of Waterloo on the Computer Science map
- Developing software techniques that have significantly reduced the complexity of building Web-based systems

## Memorable Experiences:

My career has been one long memorable experience focused mostly on the University of Waterloo:

- Being part of one of Canada's most innovative Universities for 45 years
- Working with an incredible team of innovative academic and business thinkers during my entire career, in particular, Wes Graham and Ralph Stanton
- A year spent at XEROX-PARC shortly after it was founded while concurrently working with Vint Cerf at Stanford on aspects of ARPANet architectures



### Words of Wisdom:

*We must work to reduce the complexity of building, operating and maintaining computer and communications systems, particularly those based on the Web and its successors. Detailed programming in many cases has to be replaced with some higher forms of expression, and the underlying technology now supports this idiom!*

## Major Achievements:

- Designing the Magnetic Tape system for the DRTE Computer in 1962: This tape system had incredible error correcting capability and was very flexible. The home grown DRTE computer was thought to be the first in Canada to use transistors, but was actually the second
- Keeping the Canadian Human-Computer Communications Society going (i.e. functioning) from 1979 to 1996, when many expected it to collapse
- Establishing (with assistance) the Computer Science Accreditation Council for CIPS in 1984
- Conference Chairman of the AI/GI/VI and GI/VI conferences from 1993 to 1998
- Editing the Graphics Interface conference proceedings from 1994 to 1998

## Memorable Experiences:

- I had many memorable experiences teaching computer science. There were students of every size and shape. One of the most interesting was Walter, who used to come to class wearing a new hat from time-to-time. Whenever he had a new hat he made a point of arriving late and clomping down the stairs so that everyone would notice. As someone who wears hats, due to a skin condition, I always admired Walter's hats.
- Being on the CIPS board for a number of years, including a term as President, gave me the opportunity to get to know many of the Computer Scientists in Canada. I was impressed with their knowledge and dedication.
- 1987: I made my first of seven trips to China to lecture on Computers, Computer Graphics and Image Processing. I went every second year, and the progress between the years was significant.



## Major Achievements:

- Helping to start and run WATCOM, the first successful University of Waterloo spin-off company
- Co-leader (with Paul Cress) of the WATFOR and WATFIV Compiler Development teams for the IBM 360 computer systems
- Received the prestigious international Grace Murray Hopper Award from the Association for Computing Machinery, "for the creation of WATFOR Compiler, the first member of a powerful new family of diagnostic and educational programming tool," among other prizes
- Co-author (with Cress and J W Graham) of three text books on FORTRAN programming, which were used in many schools around the world (these software systems and texts helped put the University of Waterloo on the Computer Science map!)

## Memorable Experiences:

- Being part of one of Canada's most innovative Universities for 30 years
- Working with an incredible team during my entire career; in particular, Wes Graham, Ralph Stanton, Don Cowan, and Paul Cress



### Words of Wisdom:

*Try to make computer systems and software easier to use. In the early days, we tried to make computing as easy to use as the phone!*

*University of Toronto - PhD 1972*

## Major Achievements:

- Joined the Department of Computer Science at the University of Toronto in 1972 and became a full Professor there in 1982
- Chair of the Computer Science Department at the University of Toronto from 1993 to 1998
- Past president of the Canadian Society for Industrial and Applied Mathematics (CSIAM)
- He is an Executive Member of IFIP WG2.5 on Numerical Software
- On the editorial board of ACM Transactions on Mathematical Software and Advances in Computational Mathematics, and also on the Advisory Board of COMPUTING
- Served on the NSERC Grant Selection Committee for Computer Science and on IBM's Engineering Advisory Board

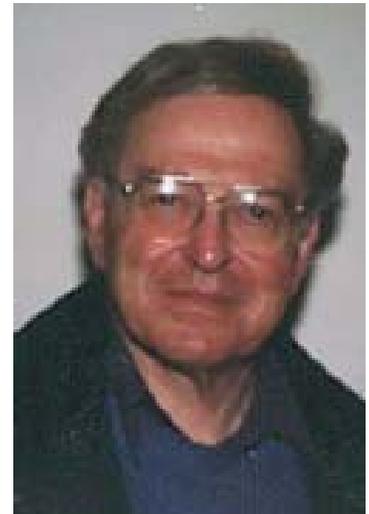


## Major Achievements:

- The development of theory and applications of network equilibrium models
- The development of the EMME/2 software package for urban and regional transportation planning of persons and freight, which is used in 72 countries on 5 continents
- The guidance of more than 75 MSc students and 35 PhD students in their research, and leading to their theses

## Memorable Experiences:

- I have many memorable experiences from travels that I have taken for lecturing and teaching students across the world, regarding the use of network equilibrium models and transportation planning models. Side trips in Brazil, China, South Africa, Hong Kong and Singapore were particularly interesting.
- Skiing in the Chilean Andes several times while discussing research topics with colleagues were unforgettable experiences
- Teaching in China with sequential translation was difficult, yet very rewarding
- The ceremony leading to an honorary doctorate at the University of Linköping was a unique and rewarding event



### Words of Wisdom:

*The successful use of mathematical models requires not only the understanding of the mathematics, but plenty of intuition as well. No model of human behaviour is perfect!*

## Major Achievements:

- He has published in areas as diverse as numerical analysis, computer algebra, complexity theory, compiler technology, operating systems, computer architecture, real-time systems, signal processing, and robotics, but for some time his primary focus has been software engineering
- He has been responsible for delivering commercial software products, as well as being involved in building large systems

## Memorable Experience:

- Research at the individual level is great fun, but limited in what it can achieve. Most significant advances in Information Technology require team efforts, and I have had the good fortune to have participated in many, from Multics to Unix, to Thoth, and to Harmony.
- Coordinating, facilitating and driving a panalogy of projects in diverse areas provides an even higher level at which an individual can extend, influence and achieve bigger accomplishments, as I experienced managing research at NRC.



### Words of Wisdom:

*As my career illustrates, diversity of discipline, and employment in the different venues of industry, government, and academia, presents a kaleidoscope of continuously changing perspectives that casts each problem as unique, and yet borrows strength and experience in other contexts. Each result adopted in practice as a reward in itself. The devil, and the prize, truly is in the details!*

### Famous Quote:

*“Industrial research, solving practical real problems of direct value to clients is enormously satisfying. It is intellectually challenging as well as contributing to wealth generation for the nation.”*

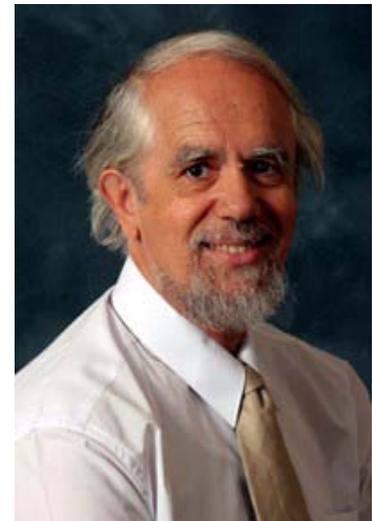
# Nicholas Georganas



University of Ottawa - PhD 1970

## Major Achievements:

- Published over 350 technical papers and is the co-author of "Queing Networks- Exact Computational Algorithms: A Unified Theory by Decomposition and Aggregation," MIT Press, 1989
- Received research grants and contracts totalling more than \$52 million
- Has supervised more than 190 researchers
- Editor-in-Chief of the ACM Transactions on Multimedia Computing, Communications and Applications
- In 1990, he was elected Fellow of IEEE for "leadership in university-industry research in, and performance evaluation of, multimedia communication networks and systems"



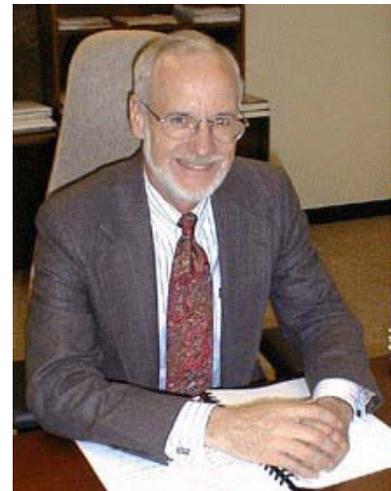
## Major Achievements:

- 1980 to 1986: Served as Dean of the Faculty of Mathematics at the University of Waterloo from, and then again from July 1998 until June 2005
- 1986 - 1988: Held the position of Distinguished Scientist at the Oak Ridge National Laboratory and University Professor of Mathematics and Computer Science at the University of Tennessee at Knoxville
- 1988: Returned to the University of Waterloo as Vice-President, Academic & Provost, completing a five-year term on June 30, 1993
- Author or coauthor of more than 100 research articles and two books, and co-editor of two other books
- With his students, he has developed a widely-used mathematical software package (SPARSPAK) for solving sparse systems of equations and sparse least squares problems

## Memorable Experiences:

My research experiences are probably the most memorable. I have had the good fortune to work in an area where making advances has had a significant practical impact, which makes the work even more satisfying.

- Discovering new algorithms that allow for the solution of problems more rapidly than anyone believed possible has been exhilarating
- I have also had the opportunity to serve as Dean of Mathematics (twice), Provost (twice), and Associate Provost, Information Systems & Technology at the University of Waterloo. That too has provided a wonderful medley of interesting and memorable experiences



### Famous Quote:

“Computer Science as a discipline has reached a modest level of maturity. However, despite the appearance that computers and their use is pervasive, their application is really still in its infancy”

### Words of Wisdom:

*The application of increasingly powerful computers, together with wireless communication, will transform the way we live and work, and provide immense career opportunities for those interested in computing!*

## Major Achievements:

- 1948: He was part of the first team in Canada assembled to design and construct digital computers, and to provide computing services
- Co-founded the original Computing Computation Centre at the University of Toronto
- Has over 100 publications in many areas of Computer Science and Information Processing, and has co-authored 4 books
- Dedicated much of his professional work to the promotion of information science and technology, and the advancement of national and international cooperation in this field

## Memorable Experience:

- Back in 1947 when I read about ENIAC -- the giant electronic brain that was used to do trajectory calculations for shells

## Moment of Truth:

- During the war I worked on the proximity fuze, which entailed long and detailed calculations for such problems using a Marchant mechanical machine. That, along with the experience gained in miniature electronics required to implant small radio transmitters in the nose of shells, persuaded me that this was a technology with an exciting future!



### Words of Wisdom:

*More can be learned than can be taught.  
Remember, you have more responsibility  
for what you learn than do any of your  
teachers!*

## Major Achievements:

- His first program in machine language: it calculated the sine of any given angle by using a recursive algorithm
- Since then, he has programmed many recursive algorithms, including the randomization method, a method which is used in many tools for performance evaluation and reliability
- Has Published numerous papers on numerical queuing theory and the initial bias problem in simulation
- In 1969, he joined the new Computational Science Department of the University of Saskatchewan

## Memorable Experiences:

My first exposure to computers occurred around 1962 when Professor Hans Kuenzi of the University of Zurich bought an IBM 1620 computer

- This computer could be booked on an hourly basis by students, and so I spent quite some time exploring the secrets of this machine, such as program counters and address registers, which got me hooked!

In 1964, I joined the Computer Department at Swissair. The company owned an IBM 7070 with 10000 words of memory. The only input devices of this machine were the console and tape drives. Programs were written on punch cards, and to convert these cards to tape, a smaller machine, the IBM 1401 was used.

- Most programs were written in autocoder, and only the scientific programmers (like me) used Fortran
- It took about 1 hour to convert the average Fortran program into autocoder, and to avoid repeated compilations, I got a listing of the autocoder, which then allowed me to make correction on the fly in machine language directly from the console.



### Famous Quote:

“In 1969, in my introductory computer classes at the University of Saskatchewan, many students complained that they should not be required to take any computer classes because, as they said, 'computers are only for big companies,' and they did not intend to join any such companies...How times have changed!”

### Words of Wisdom:

*Computers have matured, maybe even faster than its pioneers!*

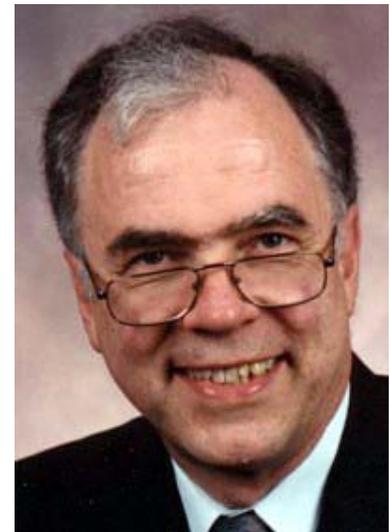
## Major Achievements:

- He is currently working on the design of routing algorithms for wireless ad-hoc networks, which has led to the development of a general continuum model of ad-hoc networks.
- Has been a faculty member of the Faculty of Computer Science at the Technical University of Nova Scotia (now amalgamated with Dalhousie University) since 1982.
- Previously, he has held positions at the Memorial University of Newfoundland, San Jose Stat College, University of Alberta and St. Francis Xavier University

## Memorable Experiences:

In the early 80's there were four of us in a fledgeling CS department at the Technical University of Nova Scotia. Most of the courses were still taught on mainframes, funding was scarce, and it was hard to get the (then new) microcomputers we wanted.

- We received a micro from Digital Equipment Corporation (it was "micro" in name only, being almost the size of a washing machine). And even though its label specified 50Hz power, it booted up, but its disk drive (8" floppies!) failed, so we arranged to ship it back, in exchange for another.
- The employees at DEC apparently misunderstood, and shipped us a new machine as well as the defective one!
- I dismantled both, compared them carefully, and discovered that the main difference appeared to be that the pulleys for the belt-driven floppies differed by 20% in Diameter
- I had the machine shop make up a modified pulley to compensate for the 50Hz vs 60Hz, and voila -- we doubled the Number of microcomputers in the department!



### Famous Quote:

"The chief passion of my career has been teaching as well as possible. Often, a teacher's challenge is to help 'debug' a student's faulty understanding of a topic. It's a thrill to me when 'the light dawns' in a student's eyes and the 'aha' reaction sets in."

### Words of Wisdom:

*Embrace opportunities, including multidisciplinary work; don't fear a radical career change.*

*Pursue a career that you enjoy (at least on most days!); don't get so involved in technology that you neglect your spiritual life; take time to help others!*

## Major Achievements:

- Professor of Electrical Engineering and Computer Science at the University of Toronto from 1968 to 1990, and a professor of Electrical and Computer Engineering at Queen's University from 1991 until his retirement in 2003, after which he has continued with research and graduate student supervision as Professor Emeritus
- While at the University of Toronto, he held positions as Director of the Computer Systems Research Institute from 1984 to 1988, and Chairman of the Division of Engineering Science from 1988 to 1990
- At Queen's University, he was Dean of the Faculty of Applied Science from 1991 to 1996
- The shared writing, along with Zvonko Vranesic and Safwat Zaky (both from U of T), of five editions of the McGraw-Hill book "Computer Organization," has been translated into a number of languages and has been widely adopted as an undergraduate textbook in Europe and the Far East, as well as in North America
- He is a Professional Engineer (retires) in Ontario, a Member of ACM and Sigma Xi, and a Life Senior Member of IEEE

## Memorable Experience:

- Helping undergraduate and graduate students learn how computers work; and working with Masters and PhD students, and colleagues, on various research projects, along with writing up the results for publication



## Major Achievements:

- As Charter Head of the Simon Fraser University Mathematics Department, he initially set up the department with Pure/Applied Mathematics and Statistics, but it quickly spread to include Computing
- Later, with Computing Science as a separate department from Mathematics, he developed a joint honours program wherein students could smoothly take on graduate work in either discipline
- He founded the BC Committee on Computing in Education with representatives from Universities, Colleges and High School Education
- Worked with research groups on medical imaging/analysis in Endocurietherapy dosimetry, MEG, PET and, since retirement, as a volunteer at SPECT
- Introduced many groups of High School students to topics on the math/computing/medicine borderline

## Memorable Experiences:

- The visit of the Queen to UBC and her inspection of the new UBC-TRIUMF modified PETTVI Tomograph
- Attending the Ph.D. graduation of students whose research went in depth across traditional discipline boundaries



## Moment of Truth:

- Realizing that truly interdisciplinary research involving medical and non-medical personnel from many different disciplines can be possible, enjoyable, and effective

### Words of Wisdom:

*Departmental boundaries, while administratively valuable, should have the flexibility to permit the development of new areas of interdisciplinary study and research!*

## Major Achievements:

- Head of the newly established Department of Computational Science at the University of Saskatchewan
- 1992: He retired from the University of Saskatchewan and was granted the title of Vice President Emeritus, Planning and Development
- 1998: He received an Honorary Doctor of Laws degree from the University of Saskatchewan in recognition of his contributions

## Memorable Experiences:

In 1967, when I was asked to be Head of the newly established Department of Computational Science at the University of Saskatchewan, there were very few trained computing scientists...Indeed, there was no consensus on what should constitute an undergraduate program in computing science.

- I am proud of the fact that by 1974, when I was asked to assume other responsibilities, we had established a core of well-qualified, excellent staff who then went on to establish the reputation of the department as one of the best.

In the early 1960's, there were many attempts to develop a "total Hospital information system."

- At least 7 groups around the world spent millions of dollars without success
- Our analysis suggested that it would be much more efficient and effective to develop a *modular*, later known as a *distributive*, computing approach
- The Royal University Hospital and the University of Saskatchewan helped in the development of these systems

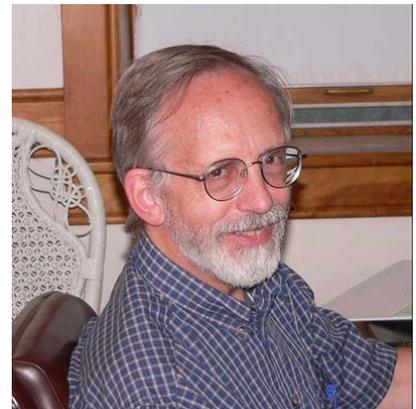


### Words of Wisdom:

*You will, or have, acquired considerable knowledge in the field of computer science. In addition, if you have completed a PhD, you will have become very knowledgeable in a fairly narrow subject area because the University System requires you to do so. But a lot of knowledge in a narrow field is not likely to lead to a broad understanding of the important issues in life. The world desperately needs bright men and women to continue to educate themselves in a broad range of subjects, seeking understanding, not just more knowledge. Your ultimate goal should be to seek wisdom!*

## Major Achievements:

- Foundational work on deadlock
- Development of a number of compilers and compilation techniques
- Development of the first Unix clone
- Authoring a dozen books on programming and operating systems
- One of the designers of the Turing programming language
- His architectural visualizations have included Linux, Mozilla (Netscape), IBM's TOBEY code generator, and Apache
- Named 16th of Top 30 IT Movers and Shakers in Canada (Computing Canada, 2005)



### Words of Wisdom:

*First rule of design: the hard part is making it simple.*

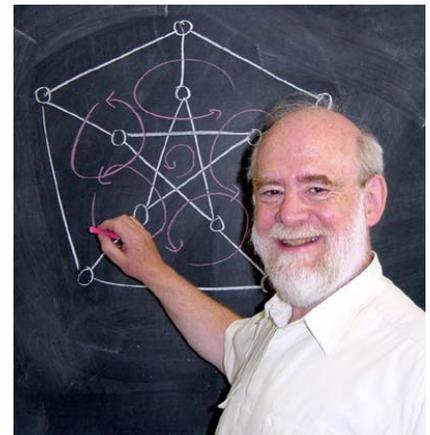
## Major Achievements:

He published the first polynomial time algorithm to find the shortest cycle basis of a graph in 1987, more than 20 years after the question was first asked.

- Short cycle bases of graphs are used in many diverse applications, including to solve electrical networks, to calculate forces in framework structures, to analyse survey networks, to find optimal cyclic schedules (such as for subway systems), categorizing organic chemicals, finding significant reactions in metabolic pathways, and the list goes on.
- A faster algorithm was found only last year!

## Memorable Experiences:

- When I was a second year student, my friends and I would sneak into the Engineering building on Saturday nights to play with the IBM1620. While learning a little bit about programming, we actually spent much of that time playing computer games.
- One summer I worked at the University of Waterloo. The software that we were using was too buggy to make much progress towards our goal of changing flowcharts drawn on a CRT into FORTRAN programs, automatically. In two weekends and the nights in between, however, I wrote a chess playing program on a few hundred cards of FORTRAN. People did not have good chess playing programs in the 1960's. Neither did I. I could beat it easily.
- My master's thesis included a rather simple FORTRAN program. The effort required was so frustrating that I refused to touch a computer for nearly five years. Then I started programming in BASIC for my job, wrote a general purpose program, and then used it to develop a financial model of the Sudbury Regional and Area Municipalities. I became hooked on computers again. Soon I owned two personal computers, before anyone else I knew had any. Then I returned to academia as a computer scientist, and I still find computers frustrating to use!



### Words of Wisdom:

*Attack the hard problems. You will learn a lot, even if you do not succeed!*

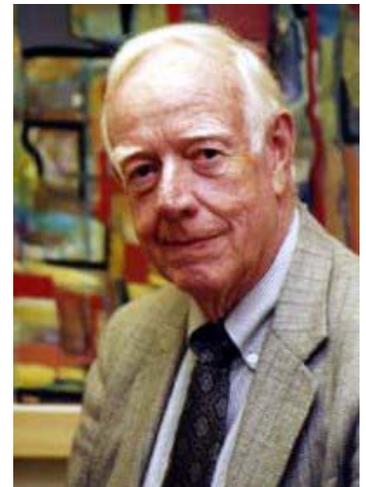
## Major Achievements:

- Instrumental in founding the Department of Computer Science at the University of Toronto in 1964, and having worked there since 1952 on the development of software, whereby creating an operating system, a debugging facility, and a programming language with compiler for the Ferut Computer
- Associate Dean for Physical Sciences in the Graduate School at the University of Toronto from 1968-1972
- Chair of the Department of Computer Science at the University of Toronto from 1975-1980
- Received a number of awards from the Ohio State University, the Scientific Institute in Rome, the Edison Foundation in New York, and the Royal Canadian Institute, for his work on Physics in educational television shows and films in the late 1950's and early 1960's
- For 7 years prior to his retirement in 1988, he was Master of Massey College and now holds the title of Master Emeritus
- Recipient of the Sandford Fleming Award in 2001
- In 2002, he was inducted into the C.I.P.A. Hall of Fame

## Memorable Experiences:

### TRANSCODE:

- It literally changed everything overnight, whereby creating a computer language so that people who work with code could communicate in English (i.e. their natural language)
- Before this time, it was almost impossible to write/ learn how to code; but with transcode, you could learn how to write programs in hours
- While at the University of Toronto in 1954, I was also part of the team that established the first long distance link between provinces in Canada, specifically, between Saskatchewan and Toronto



### Words of Wisdom:

*You cannot plan ahead what exactly you will do with an education, so you must try to understand what you are studying in depth because you never know what surprises there may be in store for you or how you may use your education.*

*In the end, you are much better off with an education than without one!*

## Major Achievements:

- Writing his first program in 1955, for his doctoral thesis in Chemical Engineering (University of Delaware), using an IBM Card Programmed Calculator (a mostly relay device, externally programmed by punched cards) in off-hours
- After graduation, he worked at Dupont Canada in Kingston Ontario, partly at chemical engineering, partly at scientific computing (OS 360)
- In 1970, he joined the newly-created Queen's Computing Science Department
- When he retired in 1994, he, Professor J.R. Cordy (Queen's) and Professor Kevin Schneider (Saskatchewan) founded Legasys Corp. in Kingston, to work on the Y2K problem using program transformation techniques

## Memorable Experiences:

- I have luckily survived at least the beginning of a paradigm shift: the Internet. It is a profound revolution in the way the world is fashioned.
- Having worked with OS/360 during its early days, I am truly impressed at the progress in system software, which is arguably the most complex and the least tractable artifact of our time, which superseded the pipe organ (1200-1900 CE) and the telephone exchange (1900-1940 CE). I am amazed that we now have (some) operating systems and hardware that have an MTBF of months, not hours.
- During the Y2K work, we came across programs that dated from the 1960's, albeit modified. The received wisdom during the 1960s and 70s suggested that programs have a natural life cycle of about 10 years...wrong! Application system design is truly resistant, almost immune, to change; so are people. There will be 1960s Cobol programs in regular use 30 years from now.



### Words of Wisdom:

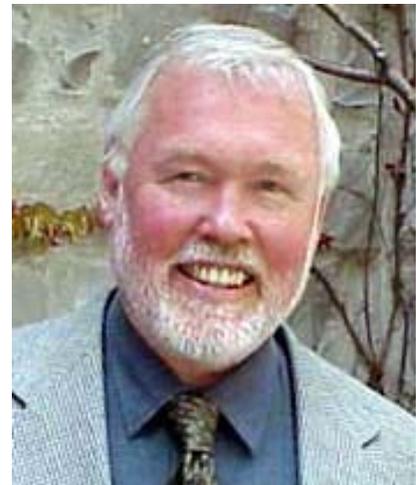
*Learn software and hardware engineering design, analysis, and theory while at University. The rest of computing is but commentary (with apologies to Hillel)!*

## Major Achievements:

- His role, with many colleagues, in developing the Computer Science Department at Queen's University into a first class undergraduate program associated with a strong research program
- His efforts within Queen's University and as a Founding Director and Executive Director of ITRC to encourage a research environment that stressed both fundamental research and entrepreneurial work with industry
- His research achievements in numerical analysis (earlier in his career)
- His work on array based programming languages at Queen's University

## Memorable Experiences:

- Both my PhD research on polynomial zerofinding and the Q'Nial project came out of insights gained by pursuing areas outside mainstream thinking at the time. Both turned on finding the right mathematical formulation of the key idea and pursuing it with vigour.
- In the winter of 1969, while working at night at IBM Yorktown in the APL project 360/50 computer room, smoke starting coming out of the computer. I called security and shut down the system. The only physical copy of the 360 assembler code for APL/360 was in the room at the time. This incident made me a strong believer in off-site back up.
- While visiting a research colleague in 1982 (I believe) at the IBM Scientific Center, Cambridge, Masseurachusetts, I attended an announcement on the IBM Personal Computer. I was able to convince the Center to fund my Q'Nial implementation project on the promise that I would build a version that ran on the IBM PC.
- While Executive Director of ITRC in 1991, I led the effort to secure a research project between the Ontario Centres of Excellence program and the Four Motors of Europe research consortium. This led to a multi-year project on Telepresence, centered at the University of Toronto, led by Bill Buxton. This established an opportunity to visit Barcelona, Milan, Stuttgart and Lyon, and to meet researchers in a variety of fields associated with Human Computer Interaction.



### Words of Wisdom:

*Follow your own research instincts...When you think you have a good idea pursue it!*

## Major Achievements:

### THE UNIVERSITY OF SASKATCHEWAN:

- We were usually able to scratch out very good facilities in the face of one of the lowest per capita technology budgets among Canadian universities
- We were a Canadian leader in the development of campus-wide Ethernet networks through our selection as one of only two Canadian universities to participate in the Digital Equipment Corporation Campus Wide Investment Program from 1985 to 1988

When I retired in 2000, many people remembered me as the person from whom they would seek counsel when beset by personal problems or frustrations in the workplace.

## Memorable Experience:

- When I worked at the University of Saskatchewan, I was part of the team that succeeded in wresting back control of our university computing environment from a provincial crown corporation in 1978

## Moment of Truth:

- The day that the faculty in a humanities department stated that the campus computer network was an 'administration boondoggle,' while also simultaneously stating that their ability to access the Library card catalogue from their office desktop computer was absolutely essential, and a great step forward!



### Words of Wisdom:

*The world is awash in technology, while also facing incredible challenges in the environment, social needs, and wellness. Use your talents to apply technology to addressing real human needs, not perpetuate our disconnection from one another and the environment!*

## Major Achievements:

- His extensive work on the characteristics and properties of the Silicon Nitride-Silicon interface and its resulting application to produce EEPROMs, which enable hand-held calculators and desktop computers to retain information and operating instructions when the power is turned off
- His work, in cooperation with Dr. Jim Haslett and Dr. Frank Schultz at the University of Calgary, on the design criteria of transistors (and later integrated circuits) to reduce electronic noise in those devices, resulted in two papers in IEEE journals that are now referred to as *seminal*
- He has won a number of teaching awards including one from the American Society of Engineering Education and one from the Western Electric Award for Excellence in Teaching

## Memorable Experience/Moment of Truth:

One particular memorable experience and moment of truth occurred when I gave a lecture on the induction motor (in a course on heavy electrical machinery):

- I knew the principles, of course, but I was very concerned about my lack of practical experience in that area that would enable me to draw examples out of the air and make the lecture interesting and meaningful
- I worked hard at that lecture, and after it was over, I received a standing ovation from the 200+ Engineering undergraduates in the class; a first and only time for me
- One student even came up to me after the lecture and said “you made that so exciting, I could swear you had only just learned about the induction motor yourself!”.....There is a real message in that comment!



### Famous Quote:

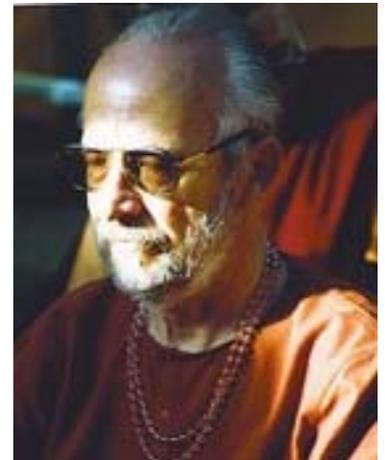
“The combination of research and teaching has always been ideal for me, and working with young people and helping to motivate them and ensure their success has been a very rewarding career. I. I can honestly say that as a Professor, Head of Department or Dean, I have always enjoyed my work; for this I feel very grateful.”

### Words of Wisdom:

*Do not be in a rush to settle on your final career. Just make sure are going to enjoy whatever you choose to do!*

## Major Achievements:

- 1965-66: Editor of "Philosophy, Pedagogics and Psychology," Verlag Herder, Freiburg, Germany
- 1966-72: Research Scientist, IBM Laboratory, Vienna, Austria
- 1972-85: Lecturer, Computer Science, University of Newcastle upon Tyne, UK
- 1985-present: Professor, Department of Computer Science and Systems, McMaster University
- Selected lengthy research fellowships at:
  - GMD, Bonn (1976 and 1988)
  - IBM Laboratory, San Jose, USA (1980)
  - Philips Research Laboratory, Eindhoven, Holland (1984)
  - Visiting Professor, Aalborg University, Denmark (1985)
  - Bell Laboratories, Murray Hill, (1994)

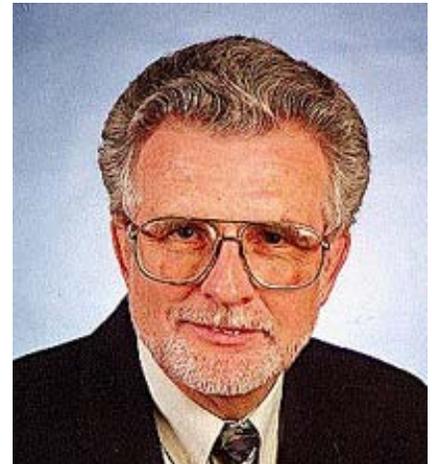


## Major Achievements:

- Founding member and later Chair of the Computer Science Department at the University of Waterloo
- As President of Algoma University College (10 years), he introduced Co-op Education and a second-degree program in Computing
- Since retirement, he has run for Parliament, was regional chair of the Ontario Trillium Foundation, is on the Group Health Centre Board, and is President of the Sault Airport

## Memorable Experiences:

- Much of my career was spent on the boundary between Applied Mathematics and Computing. It was always a joy to see how insights gained by improvements in computation could contribute to better theoretical understanding and more elegant models of the real world.
- As a founding member, and later Chair of Computer Science at the University of Waterloo, it was very gratifying to see the department's rapid growth to a world-class stature.



### Famous Quote:

"It was always a joy to see how insights gained by improvements in computation could contribute to better theoretical understanding and more elegant models of the real world."

### Words of Wisdom:

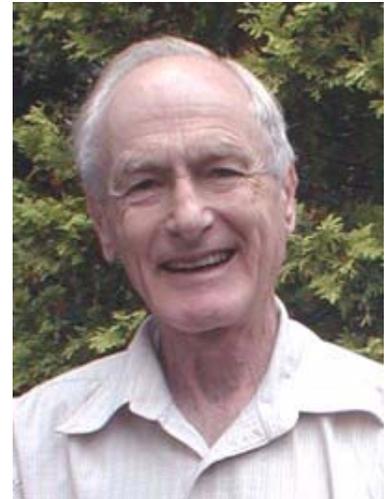
*In recent years my interests turned to University administration. My advice to young scientists would be to become fully involved in the affairs of your department and to help shape events as you would wish them to be!*

## Major Achievements:

- Moved to Canada in 1970 after teaching for 10 years at the University of London
- In the 1990's, he served 8 years as Head of Computing and Information Science at Queen's University

## Memorable Experience:

- My 15 minutes of fame occurred while I was engaged in authorship studies of classical Greek texts, notably the Pauline Epistles



### Famous Quote:

“For the majority, fulfillment in research is a series of small triumphs, not a major breakthrough.”

### Words of Wisdom:

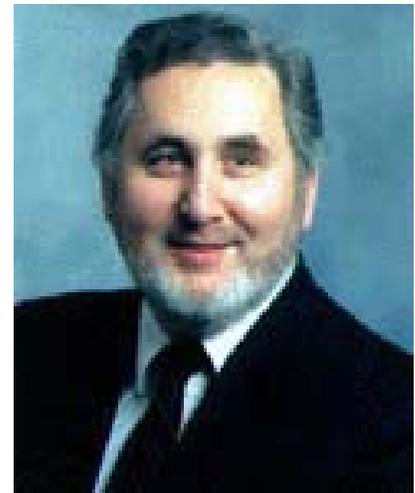
*Never forget that computers and other high-tech devices are machines, and are here to serve humans; not to enslave them.  
Leave your cell-phone at home when you go skiing, and never buy a laptop!*

## Major Achievements:

- Promoted the first conference at the University of Waterloo, which brought together leaders from industry, business, and academia to discuss the specific needs for co-op education within the Computing stream
- His *greatest* achievements have been in the area of "land related data systems," and as such, he was the architect and project leader for the automation of the National Topographic 1:50 000 map series
- Key player in the creation of the Ontario base Mapping (OBM) program, as well as building the pilot system at the University of Guelph, to demonstrate that OBM could be a viable and extremely valuable public database in digital format
- While at the University of Guelph, he was Chair of the Department of Computing & Information Science for over 10 years, during which time he worked diligently towards the integration of computing within the University's application-rich environment

## Memorable Experience:

- In the early days of Computing at the University of Waterloo, it used to be said that you could differentiate the Co-op Computer Science students by the reflection of the dollar signs in their eyes; however, in truth, it was more than money that motivated many of the students that were intrigued by the evolving science of Computing. In time, students came to reflect on the many possibilities that computing offered, and this has remained true throughout my entire career in Computing.



### Famous Quote:

“Computing Science still remains as one of the most challenging and influential components of our scientific infrastructure. Even though there will be earth-shattering developments in other disciplines, Computing Science will play a major part in all such developments.”

### Words of Wisdom:

*The best advice that one can give to a new Computer Scientist is that it is important to maintain the perspective of the philosopher in the search for new knowledge, over that of the technologist, whose role is to support and maintain existing technologies!*

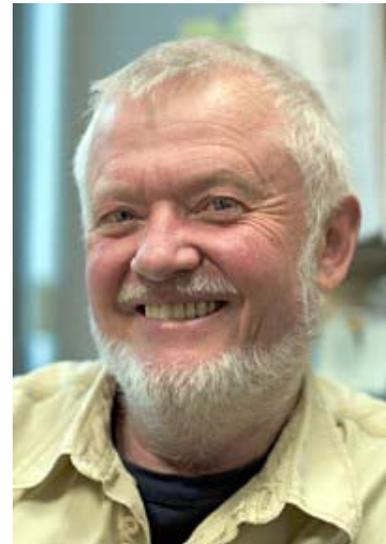
## Major Achievements:

### RESEARCH

- He has made seminal contributions to fault tolerant computing (for which he was made an IEEE Fellow), computer networking (early contributions about datagram service, architecture and performance evaluation, notably of the Cyclades Network), distributed systems (including address and location transparency), the mapping of operating system constructs to network constructs and distributed simulation, and, lately, to admission controls for multimedia QoS in IP networks

### ORGANIZATIONS

- Founding Director of the Waterloo Computer Communications Networks Group, and of the Waterloo Institute for Computer Research
- The first Chairman of the NSERC Communications and Computers Strategic Panel
- The first computer scientist to be appointed Chairman of Strategic Grants and a Member of Council



## Memorable Experiences:

- The time I opened a parcel and there was the first copy of the book I wrote
- The time several former students came up to me at a reunion and said they appreciated my help

### Words of Wisdom:

*Computers were invented to be applied and used..*

*While the computer itself is a very interesting object of study, this pursuit can become esoteric and even sterile, so it is a good idea to study computer science and X - not just computer science alone, where X could be just about anything from anthropology to zoology!*

### Famous Quote:

“It was only after my NSERC service that I learned that 'damn' and 'chemist' were two separate words!”

## Major Achievements:

- In 1962, he was recruited by the Boeing Company, Renton (WA), as a Research Engineer (programmer) in the airplane division
- After working one year as an Assistant Professor at the University of Washington, he worked at AT&T Bell Laboratories in New Jersey for 2 years as a Research Scientist, before joining the Computing Science Department at the University of Alberta in 1970
- He was an ACM National Lecturer from 1979-1981, and a McCalla Research Professor from 1985-1986
- He was President of the International Computer Chess Association from 1992-1999

## Memorable Experiences:

- AWIT, 2nd place, 1983 ACM World Computer Chess Championship
- Opportunity to play chess against Dr. Michail Botvinnik, former World Chess Champion



## Moment of Truth:

- My 1979 visit to the Institute for Systems Studies, Moscow, USSR

### Words of Wisdom:

*You learn more from a critical, but constructive review of your work than you do from superficial pleasantries!*

## Major Achievements:

- Authored over 100 research papers and supervised more than a dozen PhD's
- Held visiting positions at a number of major universities and research labs
- Former Director of Waterloo's Institute for Computer Research and former Board member of and Consultant for a variety of technology companies
- Elected Fellow of the Royal Society of Canada in 2003
- Member of the Algorithms and Complexity Group, the Database Research Group, and the Bioinformatics Group
- Canada Research Chair in Algorithm Design

## Memorable Experience:

- After presenting my first paper at a conference, a Turing Award winner immediately jumped up and asked a question, implying that I was looking at the wrong metric of the problem. Before I could recover any form of composure, one of the "young stars" of the day leapt to my defence, correctly pointing out that I had in fact done the appropriate thing and the questioner had misunderstood what had been shown in the different cases.... I do not think the Computer Science research community has changed much in its approach since then.



### Famous Quote:

“People still ask probing questions, and will make a real effort not only to be fair, but to defend the work of others. Of course, it also helps to be right, and explaining it well in the first place, avoids a lot of difficulty.”

## Major Achievements:

- 1982-1987: Chair of the Department of Computer Science at the University of Victoria
- 1988-1991: Director of LACIR (The Laboratory for Automation, Communication and Information Systems Research) at the University of Victoria....It is the official contact between the University of Victoria and the Advanced Systems Institute of British Columbia.
- 1989-1991: Chair, NSERC Grant Selection Committee on Computing and Information Sciences
- 2000-2003: Advisor on Information Technology to the Vice-president Academic

## Memorable Experiences:

- The first class I taught at Manitoba was the first time I ever had to speak in front of more than 4 people (at least people are better prepared these days)
- One memory that continues to thrill me is the pleasure of seeing the lights go on when a student finally understands a difficult concept
- Over the last 20 years, I have held a wide variety of administrative positions and served on innumerable university committees. Many of these, like the Presidential Search Committee, Research Advisory Committee and the Planning and Priorities Committee (where we were responsible for the development of the University's current Strategic Plan) were fascinating!



### Famous Quote:

"Education is not synonymous with acquiring knowledge."

### Words of Wisdom:

*Your educational experience at university is not about what you learn in your courses - it is about what you learn outside your classes!*

## Major Achievements:

- The recipient of the Most Influential Paper award at ICSE'94
- A fellow of the American Association for AI (AAAI)
- A past President of the VLDB Endowment
- Served as Program Co-chair of the International Joint Conference on AI (1991), Program Chair of the IEEE Symposium of Requirements Engineering (1997), and General Chair of the Very Large Databases Conference (2004)
- Now serving as Co-editor of the Requirements Engineering Journal



## Major Achievements:

- Books on computer chess, chronicling progress in the most exciting experiment in artificial intelligence
- His recent work on automated-theorem proving and the successful approach of combining learning and parallel search in Octopus
- His early work in the late 1960s on logical design, when working with Tom Arnold and Chung-Jen Tan (eventually IBM's leader of the Deep Blue project). Together they showed that sequential circuits could be laid out in highly regular ways, far more regular than previously realized

## Memorable Experiences:

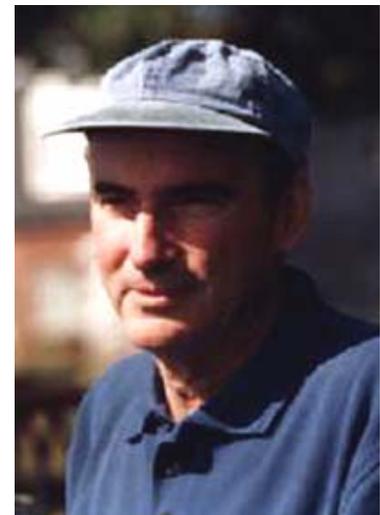
I've had many memorable experiences with my chess program Ostrich and my parallel automated theorem-proving program Octopus:

### **OSTRICH:**

- When almost finished, it tied for first place at the First World Computer Chess Championship in Sweden in 1973
- When it drew with Ken Thompson's world champion program, Belle, in 1982
- When in 1986 it defeated Chip Test, a buggy version of the program of CB Hsu, that eventually became Deep Blue

### **OCTOPUS:**

- When it did the best of all entrants on previously unseen theorems at the 2004 ATP Systems Competition at CADE-J2 in Cork, Ireland



### Famous Quote:

*"In the past, Grandmasters came to our computer tournaments to laugh. Today, they come to watch. Soon they will come to learn."*

Monty Newborn, tournament organizer, speaking at 2nd World Computer Chess Championship, Toronto, 1977.

### Words of Wisdom:

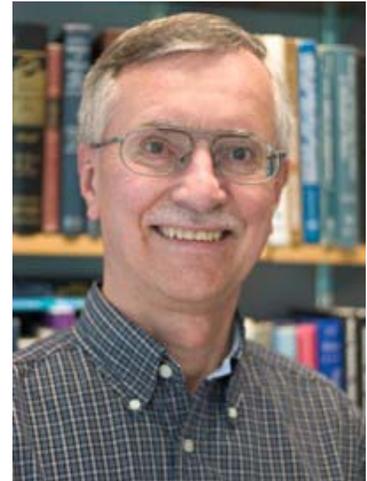
*Computers have been used by the human race for a mere half-century. They will be our companions for centuries to come. They are in their infancy! What their future applications will be, test the limits of our mind to dream. You can be one of the dreamers!*

## Major Achievements:

- His role in establishing the Co-operative Education Program in Computer Science and Mathematics at the University of Victoria.
- Upon completing his PhD in numerical analysis at the University of Toronto, he accepted a faculty position at the University of Victoria, and is happily still there!
- In 2001, he received the University of Victoria Faculty of Engineering award for teaching excellence
- Recently, working in the area of combinatorial matrix analysis, he and his collaborators have determined the first known family of spectrally arbitrary sign patterns (Linear and Multilinear Algebra 51, pp. 39-48, 2003) and the first known families of minimal spectrally arbitrary sign patterns (SIAM J. Matrix Anal. Appl. 26, pp. 257-271, 2004)

## Memorable Experiences:

- My most memorable experiences have involved world-wide travel and research collaboration with people from many countries
- During my PhD studies, Tom Hull and Richard Varga were both positive influences and inspirational figures



### Words of Wisdom:

*Pursue research that most interests you and that you find most enjoyable!*

## Major Achievements:

- Introduced and promoted the concept of model-based simulation specification language (as opposed to simulation programming languages) since the early 1970s
- Promoted component models and coupling of component models since early 1970s
- Introduced multimodels and multisimulation as powerful M&S methodologies
- Promoted synergy of artificial intelligence, system theories, cybernetics, and M&S
- Contributed to the advancement of software engineering and artificial intelligence
- Contributed to the reliability issues in artificial intelligence-directed M&S
- Promoted ethics in M&S

## Memorable Experiences:

The early days of computers remind me of the rich girl who was asked to write an essay on a poor family:

- She started her essay by stating, "this family was so poor, even the driver, the cook, and the gardener were very poor."
- After having been active in the computer field for over 40 years, owned/used more than 20 personal computers, and now that I am connected to the Internet over 8 hours a day, I can say that: "when I started my career, the world was so poor that nobody had personal computers, nobody had laser printers, and nobody had Internet, because even the concepts did not exist."
- What a wonderful experience it was to witness all the developments and to have had the chance to contribute to some aspects of computerized modeling and simulation.



### Famous Quote:

"Computers can make mistakes; however, humans would lie shamelessly."

### Words of Wisdom:

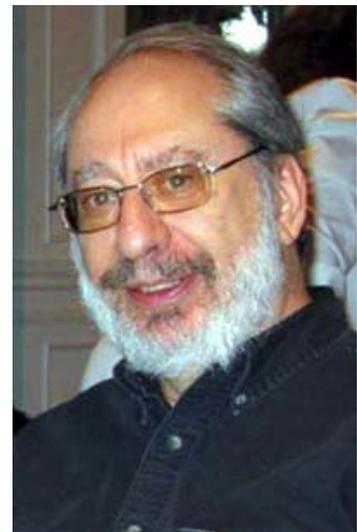
*When you are ready to walk ahead of others, you should not be amazed to notice that nobody is following you immediately; it may take some time for your message to be appreciated!*

## Major Achievements:

- Involved in both developing methodologies for teaching ethics and professional standards to computer science students, and in exploring approaches for dealing with these dilemmas as they arise in the workplace, educational institutions, and at home
- His 1967 PhD thesis, "Computer Simulation of a Biological Population with Biochemical Properties," which is still referred to
- All three editions of his books, "The Social Impact of Computers," are fairly widely used and seem to have had some impact in raising the consciousness of computer science students and the possible impact of their professional work
- His presentations to Parliamentary committees and to the U.S. National Research Council have provided him with opportunities to present his views on the impact of the Internet on civil liberties and privacy to law makers and science policy advocates

## Memorable Experiences:

- One day, in the spring of 1967, I picked up the output of my daily computer run and realized that I had achieved an important result, and so all that remained was to write it up and my PhD thesis would be complete. My computer runs consisted of about 22 minutes of computation on the University of Michigan's mainframe computer. Each minute represented about one generation in the simulation of a biological population (with biochemical properties), which I had modelled
- Shortly after arriving at UBC, I changed my research interests to *Computational Linguistics*, or more specifically, *natural language interfaces to databases*. One important realization consisted of generalizing the insight of another researcher that the given database could play an important role in providing semantic information, not currently available in the lexicon; thus, it would not be necessary to explicitly code all such information in advance
- Early in 1993, I was asked to make a presentation to a University committee concerned with the fact that university computer accounts could be used to access pornography. Out of this presentation came a comprehensive paper, which appeared in the journal, *The Information Society*. This paper aroused considerable interest, especially in Canada, and led to the founding of Electronic Frontier Canada by David Jones (McMaster), Jeff Shallit (Waterloo), and myself, in 1994. Since then, I have become very active in defending individual privacy rights in Canada and elsewhere, as well as free speech rights



### Words of Wisdom:

*You are beginning an exciting field of study, but never forget that what you and others do, may have an impact on many lives; it is up to you to shape that impact for the benefit of humanity!*

## Major Achievements:

- Author of two books and 30 articles in scholarly journals, mostly on the differential geometry of submanifolds
- Has taught a wide range of Mathematics and Computer Science courses
- Served as Department Chair, Graduate Advisor and Undergraduate Advisor at various times over the years
- At McMaster, he worked to develop a strong research-oriented faculty in Computing; oversaw the introduction of a research MSc degree in Computer Science; and helped lay the foundations for a PhD program, which will soon produce its first graduates

## Memorable Experiences:

- Throughout my career as a mathematician, I have regularly been presented with opportunities and obligations to turn my attention to computing, beginning with my summer job at Imperial Oil in Toronto in 1964, and continuing through my academic career at Notre Dame, Indiana, and McMaster University
- With the tremendous demand for instruction and curriculum development in Computer Science, and with the difficulty in hiring faculty with academic background in my area, I found myself continually pressed into service fulfilling these needs



### Words of Wisdom:

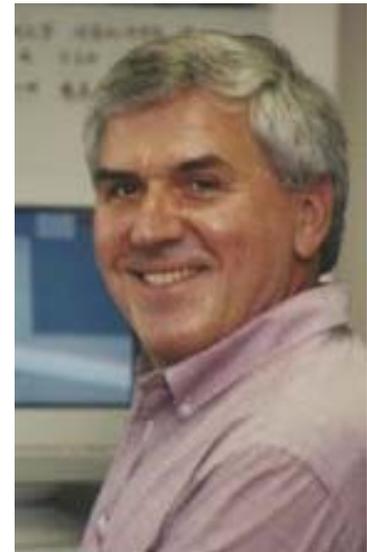
*If you aspire to break new ground in computer science, learn as much mathematics as you can!*

## Major Achievements:

- Joined the faculty at the University of Toronto in 1971, and was Chair of the Department from 1990 to 1992
- Served as Director of the Computer Systems Research Institute (CSRI)
- ACM colleague, Peter Denning, called his work in the performance evaluation field "an exemplar of experimental computer science"
- He and Maria Klawe were able to identify a number of realistic situations in systems where the stochastic assumptions were blatantly violated, while the Operational Analysis assumptions were satisfied, which helped explain why queueing network models had been successfully used to predict computer system performance even in situations where it was obvious that the stochastic assumptions did not hold

## Memorable Experiences:

- Much of my career was spent on the boundary between Applied Mathematics and Computing. It was always a joy to see how insights gained by improvements in computation could contribute to better theoretical understanding and more elegant models of the real world.
- As a founding member, and later Chair of Computer Science at the University of Waterloo, it was very gratifying to see the department's rapid growth to a world-class stature.
- When I first went to graduate school in the late '60s, I could read all the journals in computer science — the Journal of the ACM, Communications of the ACM, and a handful of others — and keep up with all of them month-to-month and know what was going on and know all the major names in the field. Now, 30 years later, that's impossible. It's hard to believe there are so many sub-fields and so many different journals. It's a struggle to keep up even in my own areas of specialty.



### Famous Quote:

"It was always a joy to see how insights gained by improvements in computation could contribute to better theoretical understanding and more elegant models of the real world."

### Words of Wisdom:

*In recent years my interests turned to University administration. My advice to young scientists would be to become fully involved in the affairs of your department and to help shape events as you would wish them to be!*

## Major Achievements:

- Since 1984, he has been with the Royal Military College in Kingston, Canada, where he is a professor in the Department of Electrical and Computer Engineering
- On arrival there in 1984, he nurtured the Software Engineering program into the healthy state it is in today, 2005, as RMC graduated its first PhD student in Software Engineering in Canada in 2004
- He was Executive Director of the Cable Telecommunications Research Institute in Ottawa (1982-84)
- He was the Manager of Computers, Communications and Controls for Canada Square Corporation in Toronto (1980-82)

## Memorable Experience:

- In about 1988, one of my colleagues who was active in the PEO encouraged me to submit my application for PEng status. In their initial review, I was assigned several undergraduate courses, including chemistry and engineering drawing, but I was also invited for an interview with the PEO Experience committee. Most of the questions I was asked were from a mechanical engineer who was interested in my experience working to fix problems with the HVAC system in a large commercial office tower. The committee was interested in breadth, and assumed that I had the computer engineering field well covered, so in the end, I only had to write the law and ethics exam that is required for all PEng candidates.



### Words of Wisdom:

*The practical limits of Computer Science keep moving, even if the theoretical ones stay more or less static, so the field will be fun for many years to come!*

*If you want a career enjoying that kind of fun, you will need a PhD. On the other hand, if you want to have fun applying computers in other disciplines, you will need knowledge of those disciplines!*

### Famous Quote:

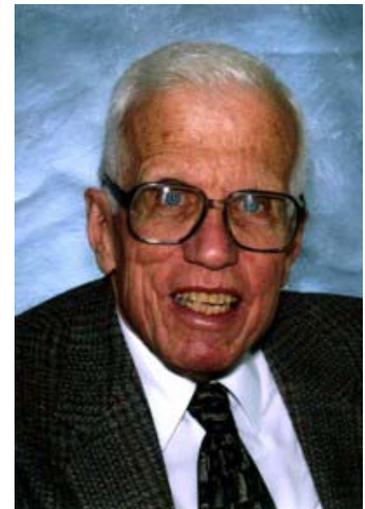
“A good engineer should be trusted to know what he or she is competent at, and that one exploration in depth in a specific area is as good as any other to find out if someone is an engineer.”

## Major Achievements:

- Worked as a Programmer and Analyst in private industry and in the Federal Government
- Arrived at the University of Alberta in 1963 as an Associate Professor in the Computing Centre and Department of Mathematics
- Joined the Department of Computing Science at the University of Alberta when it was formed in 1964, and was promoted to Professor in 1967
- On the Editorial Board of the Annals of the History of Computing
- Member, IFIP Working Group 9.7 (History of Computing)
- Since 1978, has been Secretary of the University of Alberta Faculty Club

## Memorable Experience:

- I can still remember the excitement of discovering the conciseness with which statistical algorithms could be expressed in APL, and of enjoying the convenience of developing and using them in an interactive environment. To me, APL supports the view expressed in the early 20th century by the English mathematician Alfred North Whitehead that "[B]y relieving the brain of all unnecessary work, a good notation sets it free to concentrate on more advanced problems, and in effect increases the mental power of the race."



## Moment of Truth:

- My view of programming languages has been greatly influenced by the position of Kenneth Iverson, who developed APL and J (later on, as its modern dialect): a programming language should be learned as a natural language is learned; that is, by using it to address problems in the real world rather than by an (often dreary) enumeration of its syntax.

## Major Achievements:

- Building the Graduate School at the University of Waterloo from 7 students to 750 students during my tenure as Graduate Dean
- Founding the Faculty of Mathematics, including Computer Science, at the University of Waterloo
- Promoting collaborative research in combinatorics between researchers in Australia and Canada
- Winning a Killam Prize of the Canada Council

## Memorable Experiences:

- Living and studying for a year in Rio de Janeiro during the presidency of Getulio Vargas
- Building an outstanding library of rare Portuguese books, since donated to the University of Toronto
- Receiving honorary degrees from Newcastle, Queensland, Natal, and Waterloo



### Famous Quote:

“We need to preserve a balance in Computer Science and not let fads displace good solid mathematical skills.”

### Words of Wisdom:

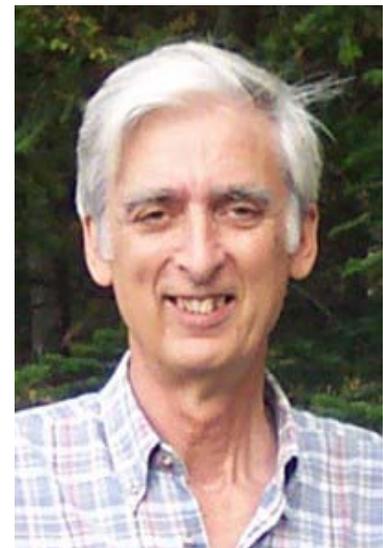
*It is unfortunate that a few pockets of Computer Science have developed that are anti-mathematical. A firm grounding in mathematics is essential for success in advanced computer studies!*

## Major Achievements:

- In 2010, he will most likely be completing his first 40 years of teaching and NRC/NSERC-funded research
- Has taught in the Department d'informatique (Computer Science) at the Universite de Montreal for almost 35 years

## Memorable Experiences:

- Reflecting on things, my strongest reaction is gratitude to the University of British Columbia for the quality of the mathematical education I received there, and to people like T. E. Hull and W. M Kahan at Toronto, who really were pioneers of computer science in Canada, and who showed me what doing research really involves.
- When I was an undergraduate, topology seemed the most abstract and useless of the various mathematical subjects on offer, but as it happens, much of my research over the last decade, in the area of robustness in solid modelling, turns around classical and more-recent work in the area of algebraic topology.



### Famous Quote:

“Christopher de Hamel: 'It makes no difference whatsoever. What does it matter when the Parthenon was put up, or whether Stonehenge is knocked down, or who wrote Homer? Of course. No. Of course it doesn't matter. In everyday terms, no, it makes not the slightest difference. But it is interesting . . . !’”

### Words of Wisdom:

*"Il faut surtout faire ce que vous aimez."  
For one, you're going to spend your whole life at it. For another, it may well happen that things you enjoy, but which appear to have no immediate practical application, turn out to be quite useful!*

## Major Achievements:

- First member and Head of the Computer Science Department at the University of Regina
- Being able to order the University of Regina's first time-shared computer, Xerox Sigma 9, in 1973
- National President of Canadian Information Processing Society
- Led a team which received grants from Canadian International Development Agency and Indian University Grants Commission (UGC) to develop a Design Model for a Computerizing University
- Maintained a relationship with China, which has lead to: an appointment as a visiting Professor at Shandong University; an agreement with CVIC SE, China's 8th largest software firm, which permits exchanges of faculty and staff and has had 24 University of Regina Co-op students experience workterm employment at CVIC SE in Jinan, China; the establishment of a subsidiary of CVIC SE - CVIC Software Services Canada in Regina; a negotiation and an agreement between the National Peoples Congress and the University of Regina
- Member of the team which saw Research Park established on the University of Regina



## Memorable Experiences:

- Dinner with Dr. Manmohan Singh, then Chairman of UGC and now Prime Minister of India
- Spending \$5,500 in the mid 1970s to purchase 8K bytes (4K words) of memory. This was 110% of the Computer Science Department equipment budget for the year
- Debating with a group of graduate students at Purdue University on whether the price of computers would eventually be cheaper than the price of a car. At that time, a VW Bug cost \$1,600 and the computer across the hall \$4.5 M

## Major Achievements:

- Co-founded (with Professor David Avis) the Computational Geometry Laboratory at McGill University in 1979
- Opened many new areas of research in the fields of Pattern Recognition, Computational Geometry, and Computational Music Theory
- Proposed the use of 2 graphs (and coined their names) for use in computer vision that have become well known: the Relative Neighbourhood Graph (RNG) and the Sphere of Influence Graph (SIG)
- Founded and Co-founded several very successful conferences and workshops
- Received a Killam Fellowship from the Canada Council for excellence in research, and the Thomson Award for excellence in Graduate Supervision and Teaching at McGill

## Memorable Experience:

- I was preparing a lecture on linkage reconfiguration problems that I planned to give at the Courant Institute of Mathematical Sciences in New York. This involved making a transparency to illustrate a recent finding of Cantarella and Johnston: that there exist linkages with universal joints consisting of six bars in 3-dimensions that are stuck, in the sense that they cannot be reconfigured into convex position. I thought it would be much more interesting for the audience if I passed around a model, so I bought some drinking straws and set about to build the model the drawings in their paper. When I finished, however, I noticed that I had made a mistake in the construction; it took me several seconds to realize that I had discovered a new class of stuck unknotted hexagons...I was thrilled!

The moral of the story is that building and playing with physical models, as well as serendipity, are both very important!



### Famous Quote:

“By Albert Einstein: 'Imagination is more important than knowledge'.”

### Words of Wisdom:

*Do what you feel most passionately about and persevere!*

*Case Western Institute - PhD 1969*

## Major Achievements:

- He and Paul Sorenson were involved, for many years, in metaCASE research that resulted in the metaCASE prototype tool called "Metaview"
- Wrote many computer science books, over a period of 35 years, that were used in many four-year undergraduate degree programs in Computer Science and Management Information Systems
- The student editions of his first two books, entitled "Discrete Mathematical Structures With Applications To Computer Science" and "An Introduction To Data Structures With Applications," that were published in the McGraw-Hill Computer Science series in 1975 and 1976, respectively, are still available in Singapore, Pakistan, and India, and have resulted in sales over 1 million copies
- A decade ago, he was the recipient of the prestigious yearly Master Teacher Award

## Memorable Experiences:

- Teaching for some 40 years (35 of which have been at the University of Saskatchewan)
- Supervising graduate students over many years

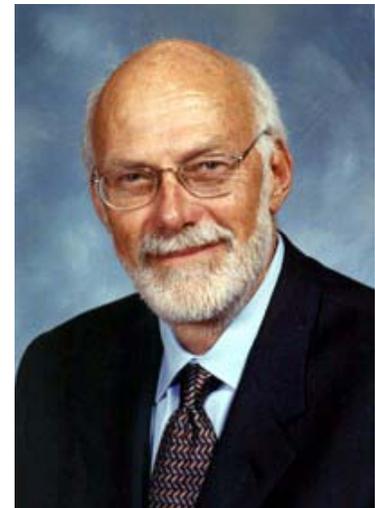


## Major Achievements:

- Executive Director of the Grid Research Centre and Professor of Computer Science at the University of Calgary
- Founding President and CEO of the "Informatics Circle of Research Excellence," from 1999 to 2004
- Co-principal Investigator of WestGrid
- Founding President of Netera Alliance and Jade Simulations International

## Memorable Experiences:

- Under my leadership, iCORE invested over \$40 million to fund 17 Chairs and Professors whose research teams now include over 500 faculty, post doctoral fellows, research staff, and graduate students working in targeted areas within the communication networks, nano-informatics, and intelligent software systems areas. This was the most rewarding period in my career.
- When I received the 2004 IWAY Public Leadership award for my outstanding contribution to Canada's information society. This was a high point that followed over a decade of work as the Founding President of Netera Alliance ([www.netera.ca](http://www.netera.ca)), a research consortium aimed at advanced computing and networking, and as the Founding Board Chair of C3.ca ([www.c3.ca](http://www.c3.ca)), a consortium of over 30 universities, corporations and government agencies that is aimed at building Canada's infrastructure in high performance computation.



### Words of Wisdom:

*Learn to be more "aware" of the vast streams of information available to you. Learn how to broadly browse these streams, to "practice" filtering, prioritizing, and focusing on your own deep explorations of topics that catch your interest. Get involved in team projects that grab your attention!*

## Major Achievements:

- Joined the Department of Machine Intelligence at the University of Edinburgh, where he became involved in the development of logic programming
- In Canada, at the universities of Waterloo and Victoria, he has taught and published in logic programming, artificial intelligence, and software engineering

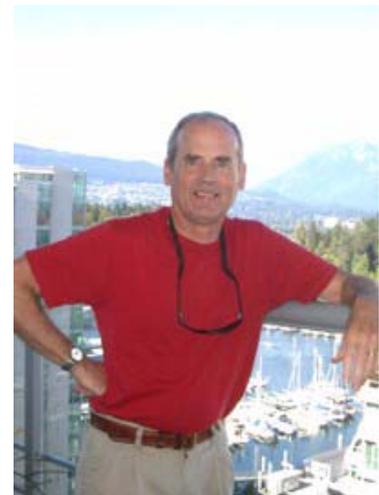


## Major Achievements:

- Has had had 5 PhD students
- Served as Head of the Computer Science Department at the University of British Columbia from 1983-1987
- Was the Director of the Centre for Integrated Computer Systems Research (CICSR) from 1987-1996

## Memorable Experiences:

- I feel extremely fortunate to have been able to work as an academic, doing basic research in numerical computation for 40 years, and working with some of the best people in the field, including Jim Wilkinson and Gene Golub. At the University of British Columbia, Uri Ascher and I have created and developed a research group in numerical computation, which has grown to 6 faculty members.
- In 1984, KD Srivastava (from ECE) and I created CICSR, which later attracted significant funding for research and for a new building, housing CICSR and the CS Department, which opened in 1993. Subsequently, we co-directed the ICICS proposal to CFI, which resulted in a second building and related infrastructure, and which just opened in 2005. These buildings were essential for the continued growth of research in Computer Science and Engineering at UBC.
- In January 2004, I was honoured, along with Alan George and Michael Saunders, on the occasion of our 60th birthdays, at a special meeting held at Stanford. All 3 of us were graduate students at Stanford, and all 3 of us have maintained a close connection with Stanford ever since.



### Famous Quote:

“Make every day count. It turns out that there aren't that many of them!”

### Words of Wisdom:

*Don't be afraid to look 'outside the box'.  
many of my best professional experiences  
came from interacting with people outside  
my primary fields of Mathematics and  
Computer Science!*

## Major Achievements:

- One of the first to recognize the importance of precise and formal specifications for the analysis and logical verification, the semi-automatic development of implementations, and the systematic testing of communication protocols (an area later called "protocol engineering")
- One of the first to propose the systematic testing of protocol implementations in respect to their formal specification (his work was related to conformance testing, test suite development, and fault diagnosis)
- Now the Coordinator for Theme 1 on "Network Architectures" in the NSERC research network on "Agile All-Photonic Networks"

## Moments of Truth:

Two principles have guided my research activities:

- (1) Trying to find solutions to real-world problems or finding working methods and tools that can be used in the practice of computer science and engineering
- (2) Finding elegant (i.e. simple) approaches, formulas, or algorithms for achieving some purpose

The first principle made me change my career from theoretical physics to computer science in 1971. The second principle is related to the purpose of natural sciences ( in particular, physics): finding simple laws that can explain our world.



### Famous Quote:

“In the last 35 years, I have seen many profound changes in the area of computer science; but there are also certain principles that have not changed.”

### Words of Wisdom:

*You must be flexible to adapt to new developments, and you should judge each new development to determine whether it is a fad (that will pass) or a direction for the future. This distinction is often difficult to do!*

## Major Achievements:

- 1968: He joined the faculty of the Department of Electrical Engineering and Computer Science at the University of Toronto, where he is now a Professor
- During the academic years 1977 to 1978 and 1984 to 1985, he was a Senior Visitor in the Computer Laboratory at the University of Cambridge, England, and in the Institut de Programmation at the University of Paris, France
- At the University of Toronto, he served as the Director of the Computer Engineering Program from 1991 to 1995, and as Chair of the Division of Engineering Science from 1995 to 2000
- He was one of the co-founders of Microdesign Ltd. (The company's early products included ICON microcomputers, which were used widely in the Ontario high-school system).

## Memorable Experience:

- In the mid-1960's when I was still a graduate student, computers were large and expensive machines that were not easy to use. Each computer installation required a number of operators and technicians to look after the machines.

But one day we experienced a stunningly different situation: our laboratory managed to acquire its first minicomputer. The usual procedure was to have a technician come in and install the machine, but unfortunately, there were no technicians available and it looked as if we would have to wait a rather long time before we could start using the machine. After several unsuccessful phone calls to the out-of-town manufacturer, we were told that we could try to unpack the machine ourselves, and turn it on to see if it worked. To our surprise, this turned out to be a very sound advice! The documentation was adequate and the software provided in the form of punched paper tapes was functional, giving us a usable computer without needing assistance from a specialist. The impression on me was huge!

A trend for the future became vividly clear. Computers would soon become much more powerful, cheaper, and easier to use.



### Famous Quote:

“In a long career there are many events that leave a lasting impression.”

### Words of Wisdom:

*Get excited about new technology and try to exploit it as quickly as possible.*

*Dream big, use your imagination, work hard, and success will follow!*

## Major Achievements:

- During a five-year stay in Moscow, he found algorithms for enumerating labelled and unlabelled 3-connected graphs and 3-connected planar maps up to orientation-preserving homeomorphism and for generating one representative of each homeomorphism class of maps of a given orientable genus without storing them
- While at the University of Western Ontario, he worked with Professor Irene Gargantini (who was, at that time, the Chairman of the Computer Science Department), analyzing the space-complexity of her data structure for coding binary pictures and the time-complexity of her image-processing algorithms on that data structure
- Has 48 refereed publications in mathematics and computer science

## Memorable Experience:

- In 1980, after spending two years in Bordeaux, France and five years in Moscow, USSR, I returned to Canada knowing that the shortage of jobs in mathematics departments, at that time, would necessitate a switch to computer science. I made the minimal one - to algorithm design and analysis - by applying the same enumerative techniques to count bits of memory and CPU cycles necessary to execute algorithms as a function of the input size.



## Moment of Truth:

- My most memorable "Eureka" experience, which I had during a two-year stay in Bordeaux, France, was the discovery of a genus-preserving bijection between hypermaps and 2-coloured bipartite maps, which have since been named "Walsh maps" (not by me, of course).

### Words of Wisdom:

*Rule 7C: don't take yourself too seriously!*

### Famous Quote:

"I follow my advice in lectures by trying to give humorous examples to illustrate the concepts that I teach; for instance, a binary heap is illustrated by a hierarchical relation on a set of prisoners who fight to become the next one to be released, flows in networks by a network of bootleggers during the days of prohibition, and the composition of two relations by a frog jumping from rock to rock to catch a fly."

## Major Achievements:

- Having the vision and plans to execute that vision; to create both an academic environment to foster and develop aspiring computer scientists, and, at the same time, to fund that environment through collaborative ventures with both private and public entities
- Creating the first Faculty of Computer Science at the University of New Brunswick (1990) and becoming the first Dean of Computer Science in Canada
- Being able to find ways to keep a talented group of intellectuals focused, in harmony, and pulling in the same direction, at the same time as having to navigate through political waters at the administrative levels, through significant changes in University direction, and during times of pressure from other faculties for limited funds and resources. This required dedication and perseverance.

## Memorable Experiences:

- Witnessing the installation of our IBM 360/158 mainframe with virtual semiconductor memory in 1972 (with a cost of about \$1M)
- Being nominated for an Excellence in Teaching Award by the students at the University New Brunswick in 2003 (although I was not eligible for the award since I retired!)
- Having the University of New Brunswick Computing Centre named after me (i.e. "The Wasson Computing Centre") in 2003



### Words of Wisdom:

*Despite their best intentions, many people "forget" the details of agreements and conversations. It is a very good idea to take the time to document both proposals and ideas in written form, as well as annotate them through their lifecycle and keep records of them for historic purposes!*

### Famous Quote:

“A career that spans 41 years is going to witness many different administrative challenges and changes. I am proud of my longevity and the continual endorsement and support of my peers, colleagues and University administration.”

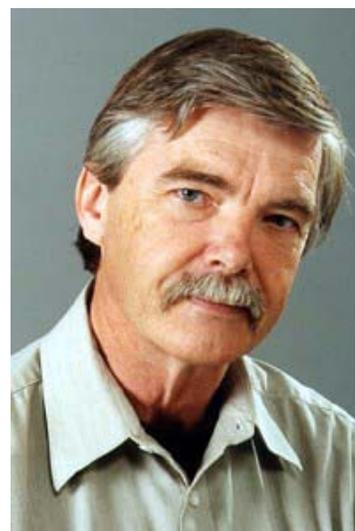
## Major Achievements:

- His early work during the 1970s in primality testing was done with several student coauthors, most of whom have gone on to become established academics. During this time, they had the *best* algorithms for doing this
- Internationally recognized as an expert in computational number theory and its application to cryptography; in particular, he is a world authority on computing in a number fields
- One of the first to use modern mathematical techniques for securing and authenticating communication; indeed, he developed a variant of an idea of Michael Rabin which is now a very widely mentioned cryptosystem
- Published 137 refereed journal papers, 25 refereed conference papers and 21 books (or chapters therein)
- The publication in 1998 of his book, "Edouard Lucas and Primality Testing"
- 1983-85: Held a national Killam Research Fellowship

## Memorable Experiences:

I have devoted my academic life to the development of fast algorithms for solving difficult problems in number theory. Some of my memorable experiences include:

- The discovery, very recently, of 12 *new* pseudosquares. (The last time so many were found was back in 1924).
- Being invited to present the second N. G. W. H. Beeger Lecture in Leiden in 1994. (This is one of the most prestigious honours in existence for a computational number theorist).
- Launching the Centre for Information Security and Cryptography (CISaC) in 2003 at the University of Calgary



### Famous Quote:

“[Primality testing] is a fascinating problem, one which has occupied a place in the history of human endeavour for several centuries and continues to bewitch and intrigue some of the best mathematical minds in existence.”

Hugh Williams, Edouard Lucas and Primality Testing, 1998

### Words of Wisdom:

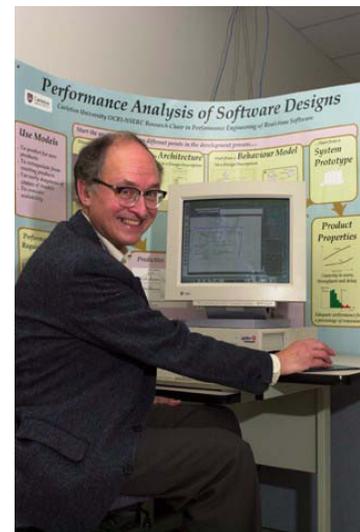
*The career of any academic is often challenged by disappointments, setbacks, and regrets. Please remember that when these unfortunate things happen, that you got into this business to work, learn, and impart what you know to others. Console yourself in your work; it is, after all, the reason that you joined the academy!*

## Major Achievements:

- Software performance engineering concepts and studies, including the creation (with others) of the ACM Workshop on Software and Performance, as well as contributions to layered queuing analysis, from initial insights to applications, to distributed software, to tools which are widely used
- Research on queues, including the "Vertex Allocation Theorem" for networks, which showed that it is better to separate workloads than to merge them (with Satish Traipathi); and the computation of autocorrelation functions for general queues (with Bernie Pagurek)
- Recently, the application of tracking filters to queuing models, an echo of his early career in Control Systems

## Memorable Experiences:

- I am rather surprised to think back to my first computer, the Edsac II at Cambridge, which I believe was the first core-store machine to run. The computer included a computer game for two players, with a ship and a plane, and as the players depressed switches, the plane dropped a bomb and the ship fired a shell. Hits were accomplished by the ship sinking or the plane falling into the sea. This was a machine with only 5K bytes of memory!
- 1965: Directing the NORAD computer at North Bay for an afternoon, where I ran tests on why the standby power supply was crashing the computer



### Words of Wisdom:

*Think first, compute after!*





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