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Name: Michael Roy Williams
 Date of Birth: (available on request)
 Address: Department of Computer Science,
 University of Calgary,
 Calgary, Alberta, Canada T2N 1N4

Phone: work: (403) 220-2044

E-mail: m.williams@computer.org

Education: BSc - University of Alberta, Canada (1964 - Chemistry)
 PhD - University of Glasgow, Scotland (1968 - Computer Science)
 DSc - University of Glasgow, Scotland (2005 - Honorary Degree)

Postgraduate Experience

1965 - 1968 Lecturer, University of Glasgow (Scotland), Department of Computer Science
 1968 - 1973 Assistant Professor, University of Calgary, Department of Mathematics
 1970 - 1973 Chairman of the Division of Computing Science, University of Calgary
 1973 Visiting Professor, University of St. Andrews (Scotland)
 1975 Associate Professor, Department of Computer Science, University of Calgary
 1978 - 1981 Assistant Dean, Faculty of Science, University of Calgary
 1981 - 1982 Professor, Department of Computer Science, California State University, Chico
 1985- 1997 Professor, Department of Computer Science, University of Calgary
 1986 Given special leave to take the appointment as Historian/Curator of Computers
 at the National Museum of American History, Smithsonian Institution,
 Washington D.C., U.S.A.
 1997-present Appointed Professor Emeritus of Computer Science
 2001- 2005 Head Curator, Computer History Museum, Mountain View, California

Academic Experience

During my academic appointments I have taught a wide range of courses in the field of Computer Science, ranging from first year to post graduate level. I have always carried a full teaching load except during those years when I had administrative appointments which included teaching relief. The courses I have taught all obtained some of the best student evaluation results of any courses offered by my Department and I have always ranked at about the 95th percentile mark in comparison to professors in the entire Faculty of Science.

My teaching duties have not been confined to the Department of Computer Science. In the past I have been asked to participate in the teaching of other Departments, eg. the History of Mathematics, the Summer Institute organized by the Faculty of Engineering, the interdisciplinary courses offered by the Faculty of General Studies, the museum related courses offered by the Department of Archaeology, and elective courses for the Faculty of Medicine.

I have supervised 7 MSc students and 1 PhD student while a member of the staff at the University of Calgary. In addition I have been a member of many MSc and PhD supervision and examination groups in the Departments of Computer Science, Chemistry, Physics, Civil Engineering, Mathematics, Educational Psychology and Environmental Design at the University of Calgary.

Administrative Experience

I have a commitment to the administration of both the University of Calgary and several outside groups. I have served as the Chairman of the Division of Computing Science (3 years) and as the Assistant Dean of the Faculty of Science (3 years). In addition I have also served on many of the typical University/community groups, of which the following constitute a sample:

- Board of Directors of the Canadian Information Processing Society, Calgary Section (1972 - 1974)
- Advisory Committee on Computing Technology for the Southern Alberta Institute of Technology (the President of SAIT has renewed my one year appointment on this group each year from 1968 until 1992).
- Faculty of Science committee to decide on the structure and makeup of the new Department of Computer Science at the University of Calgary.
- Committee to decide on the structure of the new Faculty of Science at the University of Calgary (1975).
- Committees to select various senior appointments, for example: a Dean for the new Faculty of Science, 1975; and again in 1984; an Academic Vice President, 1975; an Assistant to the Academic Vice President 1977; a Head for the Department of Mathematics and Statistics (1981) etc.
- Executive Committee of the Faculty of Science (1976 - 1980 and again 1982 -1984 and again 1984 - 1986).
- House Committee, University of Calgary Faculty Club (1976-77 Chairman).
- Faculty of Science Curriculum Committee (1978 - 1981)
- member of the Science Division Advisory Committee, University of Calgary Library, (1978 - 1980 and again 1984 - 1986)
- University College Council (1978 - 1981)
- General Faculties Council committee on Admissions and Transfer (CAT) (1979 - 1981)
- University of Calgary Native Student Admission Panel (1979 - 1981)
- Faculty of Medicine (CAT) Admission Appeals Committee (1979)
- General Faculties Council Curriculum and Academic Review Committee (CARC) (1982)
- General Faculties Council Telematics Committee, 1985-86
- Faculty of Science committee to establish teaching evaluation policies and procedures (chairman)
- University of Calgary Faculty Association Economic Benefits Advisory Committee (1991-1993)
- General Faculties Council Appeals Committee on Nonacademic Misconduct (1991-1992)
- Faculty of General Studies Curriculum Committee (1991-1992)
- University of Calgary Faculty Association Economic Benefits negotiating team member (1993-1995)
- Chairman, General Faculties Council Student Misconduct Appeals Committee (1993)
- Member of The University of Calgary Faculty Association financial bargaining team (1993- 1996)
- Member of The University of Calgary Faculty Association salary structure bargaining team (1996)
- My various IEEE Computer Society positions have given me administrative experience in many different areas of publishing and general administration.

Honors and Awards

C.C. Gotlieb Award - "In recognition of Outstanding Contributions to the Canadian Information Processing Society and to the Profession on CIPS behalf." Presented by Canadian Prime Minister Brian Mulroney, May 17, 1990

University of Calgary, Faculty of Science, Award of Excellence for Consistently Outstanding Contributions in Teaching, April 1993.

IEEE Computer Society Certificate of Appreciation "For distinguished service to the IEEE Annals of the History of Computing as Assistant Editor-in-Chief since 1987", February 1, 1994.

Awarded The Order of the Good Servant (an award given to one person each year in recognition of their services to the University of Calgary Faculty Association), April 10, 1996.

IEEE Computer Society Meritorious Service Award "For dedicated and outstanding service as Editor-in-

Chief of *IEEE Annals* between 1996 and 1999".

IEEE Computer Society Golden Core Member, 2005

Honorary Doctor of Science "For contributions to computer science, particularly its history", University of Glasgow, 2005

Membership in Professional Associations or Learned Societies

Member of the Computer Society of the IEEE
Senior Member of the IEEE

Major External Professional Activities

- 1968 - 1992: Southern Alberta Institute of Technology Advisory Committee on Computer Technology
- 1973 - present: review author for *Computing Reviews*
- 1979 : Was asked by the opening display committee to create a quality display to help celebrate the opening of the Nickel Arts Museum. The resulting display "From the Abacus to the Computer" was one of the largest single display of historical calculating equipment ever presented in Canada.
- 1979 : National Lecturer for the Canadian Information Processing Society.
- 1979 : Acted in an advisory capacity to the Glenbow Museum when they were setting up a display ("Business as Usual") of their holdings of calculating equipment.
- 1980 : Reappointed for a second year as National Lecturer for the Canadian Information Processing Society.
- 1982 : Review author for the *Annals of the History of Computing*.
- 1983 - 1992 : Editorial Board of the Charles Babbage Institute (Historical Reprint Series).
- 1983 : Fellowship Selection Committee of the Charles Babbage Institute.
- 1984 - present : Editorial Board of the MIT Press Series in the History of Computing.
- 1984 : Consultant to the Alberta Provincial Museum on their display of Calculating Equipment set up during the Summer of 1984.
- 1986 : Commissioned by the CBC program "IDEAS" to produce a one hour program *Beyond Fingers and Thumbs*, aired on Nov. 21, 1986 and again about once every year.
- 1986 : Asked by the Smithsonian Institution to join their staff on a temporary basis to assume the duties of computer historian/curator until they could find a full time person.
- 1987 - 1995 : Assistant Editor-in-Chief of the *Annals of the History of Computing*.
- 1988 : Appointed for another three month period as historian at the Smithsonian National Museum of American History.
- 1988 : Consultant editor to Time-Life Books, Understanding Computers Series.
- 1990 : Consultant editor to St. Remy Press, Montreal, Computer Book Series.
- 1991 - 1994: History Committee of the IEEE and a member of the Board of the IEEE History Center at Rutgers University.
- 1991 : IEEE History Committee Fellowship selection Committee (chairman 1992).
- 1992: Member of the IFIP Working Group (WG 9.7) on the History of Computation.
- 1993 - present Assistant Editor-in-Chief (responsible for Special Issues) of the *Annals of the History of Computing*.
- 1994: Chairman of the international IEEE History Committee 1994 and reappointed again for 1995.
- 1994: Appointed to the Executive Committee of the Calgary Institute for the Humanities for the period 1994-1997.
- 1994- 98: Appointed to the Editorial Board of the IEEE Computer Science Press.
- 1996-1998: Appointed Editor-in-Chief of the IEEE journal *Annals of the History of Computing*
- 1996 - 1998: Member of the IEEE Computer Society Publications Board and Magazine Operations Committee.
- 1996: Member of the IEEE Computer Society History Committee
- 1996: Member of Pioneer Awards Subcommittee of the IEEE Computer Society
- 1996: Member of the IEEE History Committee
- 1998: Chairman of the IEEE Computer Society History Committee

- 1998-1999: Reappointed as Editor-in-Chief of the IEEE journal *Annals of the History of Computing*
- 1998 – 1999: Reappointed as member of the IEEE Computer Society Publications Board and Magazine Operations Committee.
- 1998 –2000 Chairman of the IEEE Computer Society History Committee.
- 2000-2001 Chairman of the IEEE Computer Society Pioneer Awards Committee.
- 2001-2004 Appointed as Editor-in-Chief of the IEEE Computer Society Press
- 2002 Elected to a one year seat on the Board of Governors of the IEEE Computer Society
- 2003 Elected to a multi-year seat on the Board of Governors of the IEEE Computer Society
- 2004 Appointed as Vice-President (Publications) of the IEEE Computer Society.
- 2004 Elected to the Publications Board of the IEEE – member of their strategic planning committee
- 2005 Elected First Vice President, IEEE Computer Society
- 2006 Elected to the Presidency of the IEEE Computer Society (2006 President Elect, 2007 President, 2008 Past President)

Research Areas

I have been active in two different research areas. In the earlier part of my academic life I concentrated my efforts in the areas of discrete mathematics and the computer algorithms necessary to solve problems in this field. From about 1973 my main research area has been in the History of Science and Technology with a special interest in the people involved with the advancement and details of devices used to perform, arithmetic.

Research Grants

- 1970 - 71 : National Research Council operating grant of \$4,000 for "An investigation into some of the computational aspects of determining the presence of sub-graphical structures."
- 1971 - 72 : National Research Council operating grant of \$3,000 for the same project.
- 1971 - 72 : National Research Council special computing grant of \$1,500.
- 1972 - 73 : National Research Council operating grant of \$3,500 for the same project.
- 1975 - 76 : National Research Council operating grant of \$4,500 for "Mixed Machine Computations in Number Theory".
- 1976 - 77 : National Research Council operating grant of \$2,000 for the same project.
- 1976 - 77 : Social Sciences and Humanities Research Council of Canada operating grant of \$3,180 for "An investigation into the Scientific Library of Charles Babbage."
- 1981 - 82 : Natural Sciences and Engineering Research Council of Canada operating grant of \$6,000 for "A Documentation System for Small to Medium Scale Computer Systems".
- 1982 - 83 : Natural Sciences and Engineering Research Council of Canada operating grant of \$7,566.00 for the same project.
- 1983 - 85 : Natural Sciences and Engineering Research Council of Canada, operating grant of \$7,519.00 for "Computer Generated Instructional Aids".
- 1983 - 84 : Social Sciences and Humanities Research Council of Canada grant (83-0001) of \$5,000.00 for the editing of the *Moore School Lectures*.
- 1985 - 86 : Social Sciences and Humanities Research Council of Canada grant of \$6,000 for the editing of the *Early British Conferences*.
- 1990 - 91 : Social Science and Humanities Research Council of Canada grant of \$8,500 for an investigation into the correspondence of Charles Babbage.
- 1990 - 91 : University Grants Committee close-out grant of \$2,000.00.
- 1992 - 95 : Social Sciences and Humanities Research Council of Canada grant of \$23,000 to start to document the early computer developments in Canada.
- 1996 : Operating funds of \$17,100 (U.S.) provided for the Editor-in-Chief of the *Annals of the History of Computing* (\$18,000 in 1998, \$20,000 in 1999)
- 2000 – 2003: I have been in receipt of similar amounts as Chairman of the IEEE Computer Society History

Committee and Editor-in-Chief of the Computer Society Press.

Publications in the form of Books

1. Maurer, H.A., & M. R. Williams, *A Collection of Programming Problems and Techniques*, Prentice-Hall, 1972 256pp. A fundamental text offering a range of problems (from trivial to research level) together with proposed methods of solution. It remained in print until 1981, being reprinted 12 times.
2. Williams M.R., *The Napier Tercentenary Handbook*, Tomash Publishers & MIT Press, 1983, 343pp (ed. and new introduction) This work was first published in 1914 but this is a new edition in which a number of errors have been corrected and a new commentary on the text has been added. This is not a popular press item, rather it is a special book for the historian. Printed on acid free paper with an acid free binding.
3. Williams, M.R., *A History of Computing Technology*. Prentice-Hall, 1985, 450 pp. This is a major monograph on the history of computing technology from 3000 B.C. to 1965.
4. Campbell-Kelly, M., & M.R. Williams, *The Moore School Lectures*. MIT Press 1985, 568 pp. This, like the *Napier Handbook* above, is not a popular press item but a special source book for the historian, being a complete reedit and commentary on the work of the Moore School Lectures. Printed on acid free paper with an acid free binding.
5. Williams, M.R. & J. Howlett, *Le Calcul Simplifie - Simplified Calculation* MIT Press 1986, 167 pp. This is a translation and extension of the historically important work by M. d'Ocagne first published in 1928. This is the first time it has been translated.
6. Williams, M.R. & M. Campbell-Kelly, *The Early British Conferences*, MIT Press 1988, 560pp. This, again, is a special item for the historian with only a limited edition on acid free paper and acid free bindings.
7. Aspray, W. A., A.G. Bromley, P. Ceruzzi, M. Campbell-Kelly, & M.R. Williams, *Computing Before Computers*, University of Ohio Press, 1990, 255pp. This is a major collaborative book among five of the world's best known computer historians. The collaboration was difficult as it involved work over a period of 10 years, in four countries spanning three continents.
8. Kidwell, P.A., & M.R. Williams, *The Calculating Machine, its History and Development*, MIT Press, 1992. This is a critical translation of the very rare German work *Die Rechenmaschinen* by Ernst Martin. This version is a translation and commentary in English. It will be the last volume in the Charles Babbage Reprint Series for the History of Computing.
9. Williams, M.R., *A History of Computing Technology*, second edition – revised, IEEE Computer Society Press, 1995.
10. Williams, M.R. "A Preview of Things to Come: Some Remarks on the First Generation of Computers", Chapter 1 in *The First Computers: History and Architectures* edited by Raúl Rojas and Ulf Hashagen, MIT Press, 2000.
11. Campbell-Kelly et. al. - Williams, M.R. "From Sumar To Spreadsheets: a history of table making," Oxford University Press, 2003 (chapter on difference engines)

Publications in Refereed Sources

1. Williams, M.R., "Examination Time-table Scheduling", *Proc. of the IBM Western Region User's Group*, June 1964.
2. Williams, M.R., "Examination Scheduling, Algorithm 286", *Communications of the A.C.M.*, Vol 9, No. 6, June 1966.
3. Williams, M. R. & Colijn, A.W., "Scheduling Students to Classes Using Heuristic Methods", *Proc. of the Fifth National Conference of the Canadian Computing Society*, 1966
4. Williams, M.R., "Problem Definition (graph theory algorithms)", *Proc. Conference of University Administrators*, Loughborough, England, May 1968.
5. Williams, M.R., "Colouring the Vertices of Large Graphs", *Combinatorial Structures and their Application*, Proceedings of the International Conference on Combinatorial Structures and Their Application, June, 1969, Gordon and Breach, 1969, pp 477-479.
6. Williams, M.R. & Guy, R., "Aliquot Sequences Near $10^{**}12$ ", *Proc. of the Fifth Manitoba Conference on*

Numerical Mathematics, 1974

7. Williams, M.R., "Heuristic Procedures", *Software Practice and Experience*, Vol 4, pp 237-240, 1974.
8. Williams, M.R., "The Difference Engines", *The Computer Journal*, Vol. 19, No. 1, pp 82-89, 1976
9. Williams, M.R., "The Origins of the Word Algorithm", *The Computer Journal*, Vol. 20, No. 4, pp 380, 1977.
10. Williams, M.R., "The Scientific Library of Charles Babbage", *The Annals of the History of Computing*, Vol. 3, No. 3, pp235-240, 1981.
11. Williams, M.R., "The CIPS 82 History Session", *The Annals of the History of Computing*, 'Meetings in Retrospect', Vol 4, No 3, p274, 1982.
12. Williams, M.R., "From Napier to Lucas, the use of Napier's Bones in Calculating Machinery 1617 - 1900", *The Annals of the History of Computing*, Vol 5, No. 3, pp 279 - 296, 1983.
13. Williams, M.R., Excerpts from the "Napier to Lucas" paper appeared in *Scientific American*, Vol 250, No. 5, (May, 1984) pp 72.
14. Williams, M.R., "Howard Aiken and the Harvard Computation Laboratory", *Annals of the History of Computing*, 'Meetings in Retrospect' Vol. 6, No. 2, April 1984, pp 157 - 161.
15. Williams, M.R., "Evidence for the Use of the Abacus in Canada in the 18th Century", *Proc. Session 84*, Canadian Information Processing Society, 1984 pp 327-329.
16. Williams, M.R., "The History of Computers in Canada", *Annals of the History of Computing*, Vol 7, No.1, Jan. 1985, pp 63-65.
17. Williams, M.R., "Edouard Lucas Vindicated", *Annals of the History of Computing*, Vol 6, No.4, Oct. 1984, pp 404.
18. Williams, M.R., "A Course in the History of Computation", *Annals of the History of Computing*, Vol. 7, No. 3, July 1985, pp. 241-244
19. Williams, M.R., "The Biggest and the Best: a Report on the Lawrence Livermore National Laboratory", *Annals of the History of Computing*, Vol 7, No. 2, pp 179-181.
20. Williams, M.R., "Anecdotes from the History of Computing", *Überblicke Informationsverarbeitung* 1985, pp. 221-233.
21. Williams, M.R., "Back to Basics : Octal Numeration", accepted, to appear in *Journal of Irreproducible Results*.
22. Williams, M.R., "Babbage and Bowditch: a Trans-Atlantic Connection", *Annals of the History of Computing* Vol. 9, No. 3/4 pp. 283-290.
23. Williams, M.R., "The MADDIDA", *Annals of the History of Computing*, Vol. 9, No. 3/4 pp 358.
24. Williams, M.R., "The Promptuary Papers", *Annals of the History of Computing*, Vol. 10, No. 1, pp 35-36.
25. Maurer H, and M. R. Williams, "Hypermedia and Other Computer Support as Infrastructure for Museums", *Journal of Microcomputer Applications*, April 1991, Vol. 14, pp. 117-137.
26. Williams, M.R. and A. W. Van Sinderen, "Happy Birthday Mr. Babbage", *Annals of the History of Computing*, Vol 13, No. 2, 1991, pp 125-129.
27. Williams, M.R., "Joseph Clement: The First Computer Engineer", *Annals of the History of Computing*, Vol. 14, No. 3, 1992, pp 69-76.
28. Li Di, Bai Shangshu, & M.R. Williams, "Chinese Calculators Made During the Kangxi Reign in the Quing Dynasty", *Annals of the History of Computing*, Vol. 14, No. 4, 1992, pp 63-67.
29. Williams, M.R., "The Origins, Uses, and Fate of the EDVAC", *Annals of the History of Computing*, Vol. 15, No. 1, 1993, pp 22-38.
30. Williams, M.R., "UTEC and Ferut: The University of Toronto's Computation Centre", *Annals of the History of Computing*, Vol. 16, No. 2, 1994, pp 4-12.
31. Williams, M.R., "Harmonic Analyzers": An article in *Instruments of Science, an Historical Encyclopedia*, Garland Publishing, 1998.
32. Williams, M.R., "The Last Word on Charles Babbage", *Annals of the History of Computing*, Vol. 20, Num. 4, 1998
33. Williams, M.R., "Allan Bromley" *Annals of the History of Computing*, Vol. 22, Num. 4, 2000
34. Williams, M.R., "Calvin Moores, the NOL Computer Project, and John Vincent Atanasoff: an Introduction, *Annals of the History of Computing*, Vol. 23, Num. 2, 2001, p. 50.
35. Williams, M.R., "Building a World-Class Book Collection: The Tomash Library, *Annals of the History of Computing*, Vol. 23, Num. 4, 2001, pp 39-43.
36. Williams, M.R. and Tomash, E., "The Sector, its History Scales and Uses", *Annals of the History of Computing*, Vol. 25, Num. 1, 2003, pp. 34-47.

Papers in Press

Additional Published Material

1. Williams, M.R., *A Graph Theory Model for the Computer Solution of University Time-tables and Related Problems*, PhD Thesis, Glasgow University, 1968, microfilm copies still available.
2. Williams, M.R., "Random Number Generators", *The Big Byte*, Vol 7, No. 5, 1974.
3. Williams, M.R., "The Difference Engines", Department of Computer Science "Yellow Series" Research Report No. 76/4/4.
4. Williams, M.R., "The Scientific Library of Charles Babbage", Department of Computer Science "Yellow Series" Research Report No. 80/46/4.
5. Williams, M.R., "A Brief History of Computation (Volume I)", Department of Computer Science "Yellow Series" Research Report No. 81/63/15.
6. Williams, M.R., "A Brief History of Computation (Volume II)", Department of Computer Science "Yellow Series" Research Report No. 81/64/16.
7. Williams, M.R., "Numeration", *CIPS REVIEW*, March/April 1980, pp 29-30.
8. Williams, M.R., "Greek and Egyptian Number Systems", *CIPS REVIEW*, July/Aug, 1980, pp 29-30.
9. Williams, M.R., "Knots and Tally Sticks", *CIPS REVIEW*, Sept/Oct 1980, pp 20-21.
10. Williams, M.R., "The Abacus", *CIPS REVIEW*, Nov/Dec 1980, pp 30-31.
11. Williams, M.R., "The Leybourn Quadrant", *CIPS REVIEW*, Jan/Feb 1981, pp 22-23.
12. Williams, M.R., "Napier's Bones", *CIPS REVIEW*, May/June, 1981, pp 27-28.
13. Williams, M.R., "Aids to Multiplication and Division", *CIPS REVIEW*, July/Aug 1981, pp 47-48.
14. Williams, M.R., "Two-Legged Instruments", *CIPS REVIEW*, Nov/Dec 1981, pp 29-30.
15. Williams, M.R., "The First Calculating Machines (Schickard)", *CIPS REVIEW*, Winter issue, 1982 pp 30-31.
16. Williams, M.R., "The First Calculating Machines (Pascal)", *CIPS REVIEW*, March/April 1982, pp 19-20.
17. Williams, M.R., "The First Calculating Machines (Leibnitz)", *CIPS REVIEW*, May/June 1982, pp 10-13.
18. Williams, M.R., "The Invention of Logarithms", *CIPS REVIEW*, July/Aug 1982, pp 18-20.
19. Williams, M.R., "Charles Babbage, His Life and Times", *CIPS REVIEW*, Sept/Oct 1982, pp 20-22.
20. Williams, M.R., "Babbage's Difference Engine", *CIPS REVIEW*, Nov/Dec 1982, pp 22 - 23.
21. Williams, M.R., "Konrad Zuse", *CIPS REVIEW*, May/June 1983 pp 14 - 16.
22. Williams, M.R., "Zuse's Other Machines", *CIPS REVIEW*, July/Aug 1983 pp 10 - 12.
23. Williams, M.R., "George Stibitz's First Machines", *CIPS REVIEW*, Sept/Oct, 1983, pp 13-16.
24. Williams, M.R., "The Bell Labs Model V", *CIPS REVIEW*, Nov/Dec 1983, pp 21-23.
25. Williams, M.R., "Stibitz's Later Machines", *CIPS REVIEW*, Jan/Feb 1984, pp 26-27.
26. Williams, M.R., "Aiken Leads Harvard-IBM Team to Development of a New Machine Series", *CIPS REVIEW*, July/August 1984, pp 8-10.
27. Williams, M.R., "IBM's Entry into the Calculating Machine Business" *CIPS REVIEW*, Nov./Dec. 1984, pp 18-19.
28. Williams, M.R., "The First Electronic Calculators: The ABC Machine" *CIPS REVIEW*, Jan./Feb. 1985, pp 16-18.
29. Williams, M.R., "The ENIAC", *CIPS REVIEW*, March/April 1985, pp 30-31.
30. Williams, M.R., "The ENIAC Interior", *CIPS REVIEW*, July/Aug. 1985, pp. 18-20.
31. Williams, M.R., "Alan Turing", *CIPS REVIEW*, Sept./Oct. 1985, pp. 30-32.
32. Williams, M.R., "The Robinsons and the Colossi", *CIPS REVIEW*, Jan./Feb. 1986, pp. 40-42.
33. Williams, M.R., "The Stored Program Concept", *CIPS REVIEW*, March/April 1986 pp. 29-32.
34. Williams, M.R., "Early Forms of Computer Memory", *CIPS REVIEW*, May/June 1986, pp 12-13.
35. Williams, M.R., "Delay Line Memory System", *CIPS REVIEW*, July/Aug, 1986.
36. Williams, M.R., "Electrostatic Memory Systems", *CIPS REVIEW*, Oct./Nov. 1986.
37. Williams, M.R., "Magnetic Memories", *CIPS REVIEW*, Nov./Dec., 1986, pp. 24 - 27
38. Maurer H, and M. R. Williams, "Hypermedia and Other Computer Support as Infrastructure for Museums", *IIG Report Series*, Graz, Austria, Report 297, March 1991.

39. Williams, M.R., "Burroughs, William S." biographical article appearing in *Encyclopedia of Computer Science, Third Edition* edited by A. Ralston and E. D. Reilly, Van Nostrand Reinhold, 1993, pp145-146
40. Williams, M.R., "Bush, Vannevar" biographical article appearing in *Encyclopedia of Computer Science, Third Edition* edited by A. Ralston and E. D. Reilly, Van Nostrand Reinhold, 1993 p. 148.
41. Williams, M.R., "Calculating Machines" article appearing in *Encyclopedia of Computer Science, Third Edition* edited by A. Ralston and E. D. Reilly, Van Nostrand Reinhold, 1993, pp. 157-161.
42. Williams, M.R. "Napier, John", biographical article appearing in *Encyclopedia of Computer Science, Third Edition* edited by A. Ralston and E. D. Reilly, Van Nostrand Reinhold, 1993, p. 913.
43. Williams, M.R., "The Schickard Calculator", *ETCetera, Magazine of the Early Typewriter Collector's Association*, No. 28, September 1994, pp. 4-5.
44. Williams, M.R., Several small contributions to the *Record of the Maui Meeting*, published by the Institute of Electrical Engineers of Japan, November 1996.
45. Williams, M.R., Articles for the two-volume encyclopedia *The Facts On File Dictionary of Computer Science* published by Facts on File Publications, 2000: "Computer Languages", "Parallel Processing", "Disk Storage", "Mainframe Computer", "Memory", "Microprocessor", "Software", "Turing Test", "CD-ROM", "Binary Digit", "Boolean Logic", "Byte", "Memory"
46. Williams, M.R., Articles for *The Encyclopedia of Computer Science, fourth edition*, Nature Publishing Group, 2000: "William Burroughs", "Vannevar Bush", "Calculating Machines", "John Napier".
47. Williams, M.R., "The Computer History Museum", *SIGCSE Bulletin*, Vol. 5, Num. 4, 2003, pp 12-13.
48. Williams M.R., "Does anyone remember the KDF-9", *SIGCSE Bulletin*, Vol. 6, Num 4, 2004.
49. Williams, .M.R., "Survey calculations", *SIGCSE Bulletin*, Vol. 7, Num 4, 2005.
50. Williams, M.R., "Reflections on Standards", *SIGCSE Bulletin*, in press

Major Publishing and Editorial Projects

1. Williams, M.R. (consultant), "Memory and Storage", *Understanding Computers*, Time-Life Books Inc., 128pp., 1987, 1989.
2. Williams, M.R. (consultant), "Alternative Computers", *Understanding Computers*, Time-Life Books Inc., 128pp., 1989.
3. Williams, M.R. (consultant), "The Puzzle Master", *Understanding Computers*, Time-Life Books Inc., 128pp., 1988, 1989.
4. Williams, M.R. (consultant), "Illustrated Chronology", *Understanding Computers*, Time-Life Books Inc., 128pp., 1989.
5. Williams, M.R. (editor), "Museums and Archives", *Annals of the History of Computing*, Vol. 10, No. 4, 1989, pp. 305-329.
6. Williams, M.R. (general editor), Departments, *Annals of the History of Computing*, Vol. 10, No. 4, 1989, pp. 329-380.
7. Williams, M.R. (general editor & production editor), Departments, *Annals of the History of Computing*, Vol 11, No. 1, 1989, pp. 43-64.
8. Williams, M.R. (editor), "Quotron II" by M. Phister in *Annals of the History of Computing*, Vol 11, No 2, 1989, pp. 109 - 126.
9. Williams, M.R. (general editor & production editor), Departments, *Annals of the History of Computing*, Vol 11, No. 2, 1989, pp. 131-157.
10. Williams, M.R. (editor and production editor), "Eloge: Adriaan van Wijngaarden (1916-1987)" by H. Zemanek in *Annals of the History of Computing*, Vol. 11, No 3, 1989, pp 210-224.
11. Williams, M.R. (general editor & production editor), Departments, *Annals of the History of Computing*, Vol 11, No. 3, 1989, pp. 203-210, 225-233.
12. Williams, M.R. (editor), "Museums and Archives", *Annals of the History of Computing*, Vol 11, No. 4, 1989, pp. 313-319.
13. Williams, M.R. (general editor & production editor), Departments, *Annals of the History of Computing*, Vol 11, No. 4, 1989, pp. 319-335.
14. Williams, M.R. (consultant) *How Things Work--Computers*, Time Life Books Inc., 144pp., 1991.

15. Williams, M.R. (supervisory editor) *Annals of the History of Computing*, Volume 15, Number 3, special issue on computing in Manchester.
16. Williams, M.R. special editor for a special issue of the *Annals of the History of Computing*, Volume 16, Number 2, on computing in Canada.
17. From 1996 to 1999 I was Editor-in-Chief of the IEEE journal *Annals of the History of Computing* and, as such, completely responsible for all issues.
18. 2001- 2004 I was Editor-in-Chief for the IEEE Computer Society Press
19. 2004-2005 I was Vice President for all publications of the IEEE Computer Society.

Published Reviews

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2. Selmer, E.S. (1969). "Doubly Periodic Arrays", *Computers in Number Theory*, pp 339 - 346 *Computing Reviews*, #22,863
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- 18.* Mackenzie C.E. (1980). *Coded Character Sets, History and Development*. Addison Wesley, 513 pp *Computing Reviews*, #39,983
- 19.* Hodges, A. (1983). *Alan Turing: The Enigma*, Simon & Schuster, pp 587 *Computing Reviews*, #8407-0517 Vol 25 No.7, July 1984, pp 310-311
- 20.* Ceruzzi P. (1983). *Reckoners: The Prehistory of the Digital Computer* Greenwood Press, 181pp *Technology and Culture*, April 1985, pp. 339-341.
21. de Solla Price, Derek (1984). "A History of Calculating Machines", *IEEE Micro* Vol 4 No. 1, pp 23-52, *Annals of the History of Computing*, Vol 7, No. 1, pp 74-75.
22. Morris, R. (1984). "Derek de Solla Price and the Antikythera Mechanism: An Appreciation", *IEEE Micro* Vol 4,

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 - 39.*Ceruzzi, Paul (1989). *Beyond the Limits: Flight Enters the Computer Age*, a major exhibit at the National Air and Space Museum in Washington DC and a book on the same topic, *Technology and Culture*, Vol. 31, No. 4, October 1990, pp 838-845.
 - 40.Kidwell, Peggy A. (1990). American scientists and calculating machines: from novelty to commonplace. *Annals of the History of Computing*, Vol 12, No. 1, pp 31-40, in *Computing Reviews*, Vol. 32 No. 2, Feb. 1991, p 116.
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 42. Ceruzzi, Paul E. (1991) When Computers Were Human, *Annals of the History of Computing* 13, 3, 237-244, *Computing Reviews*, Oct 1992, p. 587.
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 - 44.*Cortada, James W., *Before the Computer: IBM, NCR, Burroughs, and Remington Rand and the industry they created, 1865-1956*, Princeton University Press, 1993: in *Annals of the History of Computing*, Vol. 16, #4, 1994, pp89-90.
 45. *Levy, Steven, *Insanely great: the life and times of Macintosh, the computer that changed everything*, Penguin Books, New York, 1995: in *Computing Reviews*, November 1995
 46. *Norman R. Ball & John N. Vardalas, *Farranti-Packard: Pioneers in Canadian Electrical Manufacturing*, McGill-Queen's University Press, 1994: in *Scientia Canadensis*, Vol 47, (1995) pp 209-210.
 47. *David Rutland, *Why Computers are Computers: the SWAC and the PC*, Wren Publishers, Philomathe, OR: in *Computing Reviews*, January 1996.

48. *Michael S. Malone, *The Microprocessor: A Biography*, Springer-Verlag New York Inc., *Computing Reviews*, August 1996
49. *James W. Cortada, *The Computer in the United States*, M.E. Sharpe, Armonk, New York, 1993: *Annals of the History of Computing*, Vol. 18, Num. 4, pp. 74-75.
50. Charles J. Murray, *The Supermen: the story of Seymour Cray and the technical wizards behind the supercomputer*, 1997, in *Computing Reviews*, November 1997.
51. Annagret Kehrbaum and Bernhard Korte, *Calculi: Images of Computing in Olden and Modern Times (Calculi Bilder des Rechnens Einst und Heute)*, Bonn: Nordrhein-Westfälische Akademie der Wissenschaften, 1995, in *Annals of the History of Computing*, Vol 20, Number 2, 1998
52. Hoffnagle, G.F., "IBM Systems Journal", in *Computing Reviews*, October 1999.
53. Cohen, I.B., "Makin' Numbers: Howard Aiken and the Computer", in *Technology and Culture*, Oct. 2000
54. Cohen, I.B., "Howard Aiken: Portrait of a Computer Pioneer", in *Technology and Culture*, Oct. 2000
55. Russo, Thomas, *Antique Office Machines*, Schiffer Publishing, 2001, in *Annals of the History of Computing*, Vol. 24, Num. 4, 2002
56. Pierre Laurent, Paul Sablonniere; "Pierre Bezier: an engineer and a mathematician" *Computer Aided Geometric Design* 18(7): 609-617, 2001, in *Computing Reviews*, Feb. 2003.
57. Vardalas, John, *The Computer Revolution in Canada*, MIT Press, 2001, in *Annals of the History of Computing*, Vol. 25, Num. 1, 2003, p71.
58. Burks, Alice Rowe, *Who invented the computer? The legal battle that changed computing history*, Prometheus Books, 2002, in *Technology and Culture*, Vol. 45, April, 2004, pp. 449-450.

Conference Papers

1. Williams, M.R., "The Origins, Uses and Fate of the EDVAC", International History of Computing Conference, Manchester, England, July 19-20, 1989.
2. Williams, M.R., "The First Computer", New Results in Computer Science: an International Conference, Graz, Austria, June 20-22, 1991. Published in *Springer Verlag Lecture Notes in Computer Science*, Number 555, pp. 371-387.
3. Williams, M.R., "The EDVAC: Success and Failure in Early Computer Design", International Conference on the History of Mathematics and the Teaching of the History of Mathematics, Baotou, Inner Mongolia, August 9-14, 1991. To be published in the *Journal of the Cultural History of Mathematics*.
4. Williams, M.R., "The ENIAC: architecture and early experience", ACM Conference held in Philadelphia in Feb. 1996 to celebrate the 50th Anniversary of electronic computing.
5. Williams, M.R., "Big Iron: A Pre-Computer Technology Tutorial", The professional historians conference on the history of computing, Williamsburg, VA, July, 1997
6. Williams, M.R., "A Taste of Things to Come: the architecture of the first generation of computers", Keynote presentation at the International Conference of the History of Computers, Aug 14-16, Paderborn, Germany.
7. Williams, M.R., "What does it mean to be first?," Keynote address to the John Vincent Atanasoff Symposium on Modern computing (JVA 2006), October 4, 2006, Sofia, Bulgaria.

Displays and Productions

1. *From the Abacus to the Computer*: The opening display at the Nickle Arts Museum, Calgary.
2. *Business as Usual*: A display of calculating equipment held in the Glenbow Museum (consultant).
3. *Ancient Computing Equipment*: A display held at the Equipment Show in conjunction with the Session 84 conference of the Canadian Information Processing Society.
4. *Computing History*: A display in the main Library foyer of the University of Calgary, Spring 1985.
5. *Beyond Fingers and Thumbs*: A CBC 1 hour radio production for the national network *IDEAS* series, aired Nov. 21, 1986. This program has been submitted by the CBC as their education entry in the International

- Peabody Competition. Rebroadcast several times.
6. *Computer History*: Three radio sessions of 15 minutes each for the national network CBC *Querks and Quarks* show.
 7. *The Information Age*: A major exhibit at the Smithsonian Institution's National Museum of American History. I was the technical historian for the project for a period, and have been a consultant to the Smithsonian from 1986 to 1991.
 8. *Video History*: A CBC radio interview, Jan. 17, 1989.
 9. *Visible Storage* – an 18,000 sq foot exhibition at the Computer History Museum, open May 2003.

Invited Lectures

1. *Computer Produced Time-tables*: University of Strathclyde, Department of Operations Research, Oct. 1967
2. *The Use of a Computer in University Administration*: University of Glasgow, Department of Computer Science, Dec. 1967
3. *IFIP 68*: University of Glasgow, Department of Computer Science, Sept. 1968
4. *The Role of the University*: Introductory theme speaker, Education Evening, Information Processing Society of Canada, Calgary, 1970
5. *The Role of the University in Computer Science Education*: Information Processing Society of Canada meeting, Calgary, 1972
6. *Combinatorial Computation*: University of Lethbridge, Department of Mathematics, May 1972
7. *The Sector and the Quadrant*: University of Glasgow, Department of Computing Science, November 1973
8. *The Leybourne Quadrant*: Department of Natural Philosophy, St. Andrews University, December, 1973
9. *The History of Computation*: Canadian Information Processing Society, Vancouver, February, 1974
10. *The History of Computation*: Canadian Information Processing Society, Calgary, September, 1974
11. *Our Roman Computational Heritage*: Simon Fraser University, Department of Computing Science, November, 1974
12. *The Development of the Computer*: University Showcase Series, December, 1974, Calgary
13. *Computation in 3,000 BC*: Calgary Mathematical Association, March 1975
14. *The Origins of the Metric System*: Kirby Centre Lecture Series, March 1975
15. *Some Aspects of the History of Computation*: Canadian Information Processing Society, Victoria, October, 1975
16. *Mechanical Computing Devices*: University of Alberta, Department of Computing Science, November, 1975
17. *The History of Computation*: University of Calgary, Departments of Computer Science and Mathematics, November, 1975
18. *The Development of Analogue Computing Equipment*: Canadian Information Processing Society, Saskatoon, May 1976
19. *The Development of the Computer*: NRC Western Summer Science Program, Faculty of Engineering, University of Calgary, July, 1976
20. *Computing Before Christ*: University of Newcastle, Department of Computer Science, July, 1977
21. *The History of Digital Computation*: Canadian Information Processing Society, Kitchener/Waterloo, September, 1979
22. *The History of the Computer*: Canadian Information Processing Society, Ottawa, September, 1979
23. *Early Computer Developments*: Canadian Information Processing Society, Halifax, October, 1979
24. *Computing During the Middle Ages*: Canadian Information Processing Society, Fredericton, October, 1979
25. *The Development of the Computer*: Canadian Information Processing Society, St. John, N.B., October, 1979
26. *Computer History*: Sigma Psi, University of Calgary, October, 1979
27. *The History of Computing*: Data Processing Management Association, Calgary, March, 1980
28. *The Development of Computational Devices*: University of Regina, Department of Computer Science, March, 1980
29. *The Early Mechanical Adding Machines*: Canadian Information Processing Society, Calgary, June, 1980
30. *Bizarre Computers of the Past and Present*: University Showcase Series, November, 1980
31. *Charles Babbage - his unusual aspects*: Department of Computer Science, University of Manitoba, December 1980
32. *The Analytical and Difference Engines*: Canadian Information Processing Society, Winnipeg, December 1980

33. *The Early Analogue Computers*: Department of Computer Science, California State University, Chico, April 1981
34. *The Astrolabe as a Computer*: Canadian Information Processing Society, Edmonton, May, 1981
35. *Computer Developments in the 40's and 50's*: Canadian Information Processing Society, Saskatoon, May, 1981
36. *The History of Arithmetic*: Department of History, California State University, Chico, December, 1981
37. *Colloquium of the History of Computing*: Department of Mathematics, California State University, Chico, March, 1982
38. *Early Computer History*: AEDS, Calgary, September 1983
39. *Topics from the History of Computing*: IEEE, Southern Alberta Section, Computer Chapter, February 26, 1986.
40. *Intellects, Bums and Mathematicians*: University of Regina - Graduation Banquet, April 5, 1986
41. *The Work of Charles Babbage*: Department of the History of Science and Technology, National Museum of American History, Smithsonian Institution, Washington DC., Sept. 30, 1986
42. *From ENIAC to EDSAC: Two Revolutions in Computer Design*: Canadian Information Processing Society, Calgary, Dec. 2, 1987
43. *The Design of the First Computers*: Canadian Information Processing Society, Regina, March 24, 1988
44. *Who Really Invented the Computer*: 11th Annual Ryerson Lecture in the History of Technology, Toronto, January 25, 1989
45. *Dem Bones: The Instrumental Work of John Napier*: Department of Mathematics and Statistics, University of Calgary, March 9, 1989
46. *An Historical Perspective on Technology*: Association of Systems Managers, Paliser Hotel, Calgary, Oct. 3, 1989.
47. *Conference Wrap up with an Historical Perspective*: CIPS Conference 89, Calgary, Dec. 7, 1989.
48. *ENIAC to EDSAC: The Early History of the Computer*: a public lecture to start the 20th Anniversary celebrations of the founding of the Department of Computer Science at the University of Ottawa, Jan. 25, 1990
49. *The Development of Computing Technology*: a public lecture sponsored by the Eli Lilly Co. as part of their continuing series of such events. June 19, 1990. Indianapolis.
50. *How to Avoid Computing*: Invited talk to Institute Für Informationsverarbeitung, Graz, Austria, 16 January, 1991.
51. *Early Computers: ENIAC, EDVAC, and EDSAC*: Invited lecture at the American University, Washington D.C., USA, October 14, 1991
52. *The First Working Computer*: Invited lecture to the Department d'informatique, Universite de Montreal, March 17, 1992.
53. *The Work of John Napier*: Invited lecture to the Club Mathematique, Department de Mathematiques et de Statistique, Universite de Montreal, March 18, 1992.
54. *Life Before UNIX*: Invited lecture to the Calgary Unix Users Group, May 26, 1992.
55. *The Future as it Was*. Invited lecture to the Banff Workshop on Process Algebras, August 28, 1992.
56. *Mathematical Instruments*. Invited lecture to the Club Mathematique, Department de Mathematiques et de Statistique, Universite de Montreal, September 23, 1992.
57. *The Impact of the EDVAC*. Invited lecture to the Department d'informatique, Universite de Montreal, 24 September 1992.
58. *The Life and Times of Charles Babbage*. Invited lecture to the mathematics departments in the four universities in Montreal - sponsored by the Department de Mathematiques et de Statistique, Universite de Montreal, September 25, 1992.
59. *Computer Science: The Beginnings*, Faculty of Science Afternoon of Excellence, University of Calgary, December 20, 1993.
60. *1,2,3...*, A lecture to the combined Faculty of Science and Faculty of Humanities Associates. University of Calgary, January 27, 1995.
61. UTEC and FERUT, A lecture given to the Board of Governors of the Charles Babbage Institute, Minneapolis, MN, Sept 15, 1995.
62. Counting in Canada: historical anecdotes from the first Canadian use of the Abacus to the developments of Computers. An invited lecture given to the annual meeting of the Canadian Mathematical Association, Saturday June 8, 1996.
63. Our Mathematical Heritage. An invited lecture to the Pacific Institute of Mathematical Sciences at their inaugural

- seminar, Wednesday September 18, 1996. Calgary, Alberta.
64. Computing in Glasgow: BC to AD (Before the Computer to After Deuce), An invited lecture at the 40th anniversary of the establishment of the Computing Laboratory at the University of Glasgow, Scotland, November 22, 1997.
 65. Mathematics as an Instrumental Science: Mathematics History Colloquium, Department of Mathematics, University of Calgary, February 10, 1998.
 66. Computers in the 18th Century, 18th Century Studies Group, University of Calgary, March 18, 1998.
 67. The Other Pioneers, Address to the 60th Anniversary of the creation of Konrad Zuse's Z3, Berlin, May 12, 2001
 68. Early Computer History, Hass School of Business, University of California, Berkeley, Wed, Sept 4, 2002
 69. Vortrag zur Geschichte der Computertechnologie, Fachhochschule Karlsruhe, June 4, 2003
 70. Examples from the Computer History Museum, Informatik Sonderkolloquium, Universität Karlsruhe, Informatik für Ingenieure und Naturwissenschaftler, June 3, 2003.
 71. The Computer History Museum, talk to SIRS group, Silicon Valley chapter, August 15, 2003
 72. Stories from the history of computing, talk to the Dept. of Computer Science, University of Glasgow, July 4, 2005
 73. The history of computing technology, talk to the IEEE Student Chapter, University of Calgary, September 2005
 74. More of the history of computing technology, talk to the IEEE Student chapter, University of Calgary, Sept. 2007
 75. A Cook's tour – lecture given at the meeting of the British Association for the History of Mathematics, Oxford University, May 31, 2008

Other Items of Interest

The following additional reports have been produced at various special requests:

- Williams, M.R., *The Usefulness of a Computer to a Small Island Society*, A report prepared at the invitation of the King of Tonga.
- Williams, M.R., *The Privacy of the Individual*, A submission to the Invasion of Privacy Committee (a special committee of the Alberta Legislature).
- Williams, M.R., *The Calculator's Quadrant*, A report prepared at the invitation of the Department of Natural Philosophy of St. Andrews University (Scotland), in order that they should have a proper description of the uses of one of their ancient (17th Century) calculating devices.
- Williams, M.R., Several major working and position papers with different titles were prepared for internal use at the Smithsonian Institution for the start of the "Information Age" exhibit project (1986 - 1991).

I participated in three CBC radio productions on the topics of computer generated music and the display of calculating equipment put on in the Nickle Arts Museum (plus several other short interviews on the CBC regarding general computer topics), provided material and commentary for the ACCESS series *The Mighty Micro* (a 13 week radio series) and I was one of four U of C representatives involved in a 90 min. CBC television production of a general nature. Other major Radio productions are listed earlier under the heading "Displays and Productions"

I was a working member (responsible for statistical material) of a SSHRC sponsored archeological dig at a late post classic site in El Salvador during the summer of 1979. I was also responsible for an investigation into a new system of detecting buried ruins by heat seeking instruments while on the same dig.

Stood for election to the Canadian House of Commons during the 1980 elections.