

Pieter Steijnberg KRITZINGER

Born in South Africa on 21 February 1944

Department of Computer Science
University of Cape Town
Rhodesgift, 7707 South Africa

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Curriculum Vitae

September 13, 2005

Current Address

As above.
e-mail: psk@cs.uct.ac.za

Tertiary Education

1962–1968 University of the Witwatersrand, Johannesburg, South Africa.
1969–1972 University of Waterloo, Waterloo, Ontario, Canada.

Degrees

B.Sc. (Eng.) in Electrical Engineering, December 1965.
M.Sc. (Eng.) in Electrical Engineering, April 1968.
Ph.D. in Computer Science, April 1972.

Merit Awards

SA Philips Undergraduate Scholarship, 1964–1965.
Ernest Oppenheimer Post-graduate Fellowship, 1966. Not accepted.
National Institute for Metallurgy Post-graduate Bursary, 1966–1976.
South African National Post-graduate Scholarship, 1970–1971.
Harry Crossley Scholarship, 1979 and 1984.
IBM Travelling Fellowship, 1984.
Elected Senior Member of IEEE, 1996.

Membership of Professional Societies

Institute for Electronic and Electrical Engineers (IEEE) since 1985.
International Federation for Information Processing (IFIP) Working Group
7.3 (Computer System Modelling) since 1982. *Membership by invitation only.*
International Federation for Information Processing (IFIP) Working Group
6.1 (Computer Protocols) since 1990.

International Federation for Information Processing (IFIP) Working Group
6.3 (Performance of Computer Protocols) since 1994.

Employment History

1968–1969 *Programmer/Analyst*, NATIONAL INSTITUTE FOR METALLURGY, Johannesburg.

1972–1973 *Post-doctoral Fellow*, Department of Computer Science, UNIVERSITY OF WATERLOO, Canada.

1973–1974 *Assistant Professor*, Department of Computer Science, UNIVERSITY OF WATERLOO, Canada. Post resigned.

1975–1976 *Lecturer*, Department of Computer Science, Imperial College, UNIVERSITY OF LONDON, England. Post resigned.

1976 (3 months) *Visiting Scientist*, Fachbereich Informatik IV, UNIVERSITÄT DORTMUND, West Germany.

1977–1985 *Senior Lecturer*, Department of Computer Science, UNIVERSITY OF STELLENBOSCH, South Africa. Post resigned in June 1985.

1979–1980 (5 months) *Visiting Scientist*, Fachbereich Informatik IV, UNIVERSITÄT DORTMUND, Germany.

1981–1983 *Director (part-time)*, Institute for Applied Computer Science, UNIVERSITY OF STELLENBOSCH, South Africa.

1984 (12 months) *Visiting Scientist*, IBM ZÜRICH RESEARCH LABORATORY, Zurich, Switzerland.

1985–present *Professor*, Department of Computer Science, UNIVERSITY OF CAPE TOWN, South Africa. I was invited to apply for this Chair in Computer Science newly created in 1985.

1992 (12 months) *Visiting Scientist*, Fachbereich Informatik IV, UNIVERSITÄT DORTMUND, Germany.

1996 (2 months) *Visiting Scientist*, Lehrstuhl VII, UNIVERSITÄT ERLANGEN–NÜRNBERG, Germany.

1998 (6 weeks) *Visiting Scientist*, Lehrstuhl VII, UNIVERSITÄT ERLANGEN–NÜRNBERG, Germany.

2000 (4 weeks) *Visiting Scientist*, Lehrstuhl VII, UNIVERSITÄT ERLANGEN–NÜRNBERG, Germany.

2002 (5 weeks) *Visiting Scientist*, Lehrstuhl VII, UNIVERSITÄT ERLANGEN–NÜRNBERG, Germany.

2004 (4 months) *Visiting Scientist*, IBM ZÜRICH RESEARCH LABORATORY, Switzerland.

Business and Management Experience

Founder of the Institute for Applied Computer Science, University of Stellenbosch. Director for two years (1982–1983).

Head of the Department of Computer Science, University of Cape Town for 8 years from 1988 until 1996.

Founder and Managing Director of Computer Science Corporation (Pty) Ltd and Computer Science Institute (Pty) Ltd in March 1997. Since sold.

Director for IT Strategy, INGO Information Solutions (Pty) Ltd from February 2001 until January 2004.

Research Interests

My general research interests are in the application of formal and analytical methods to the design, specification, analysis and implementation of discrete communicating concurrent systems.

A *communicating concurrent* system is one which receives different messages from its environment and reacts to them by changing state and perhaps issuing a return message to the environment. A *discrete* system is one which reacts to such discrete events in discrete time. For example, a system which reacts to temperature changes is not discrete because temperature changes over a continuous range in continuous time. A vending machine, however, is a discrete system in that it receives individual coins at discrete instants of time. Further examples of such systems are computer networks, certain embedded digital control systems (e.g., railway signalling systems), public branch exchanges and ISDN systems, ATM networks (discrete time, in this case, represented by individual cells carrying data) and flexible manufacturing systems. The formal methods referred to here, are specification and design languages (e.g., SDL), ordinary and timed Petri nets and stochastic theory, particularly as it applies to Discrete Time Markov Chains.

Current Research Grants

I have annually received funding as a category C researcher from the South African Foundation for Research Development (NRF) since 1977.

I was awarded R680.000,00 over the period 1990 – 1994 as Leader of an NRF Development Programme in Computer Science Research Manpower Development.

In addition, I was awarded R95.000,00 per year for the period 1994 – 1996 under the NRF Special Programme in Telecommunications. I was furthermore awarded an NRF post-doctoral fellowship to the value of R50.000,00 for 1994.

I have recently been awarded R130,000 per year over the period 1996–2001 as a participant in an NRF Programme in Communications and Information.

I have been a grant holder in the Telkom Centre of Excellence Programme since its inception.

Amount and sources of research funding the last five years:

Year	Amount	Source
2001	R330,000	NRF, THRIP, Siemens Telecommunications, Telkom South Africa
2002	R313,000	NRF, THRIP, Siemens Telecommunications, Telkom South Africa
2003	R327,000	NRF, THRIP, Siemens Telecommunications, Telkom South Africa
2004	R555,000	NRF, THRIP, Siemens Telecommunications, Telkom South Africa
2005	R520,000	NRF, THRIP, IBM Research, Siemens, Telkom South Africa

Graduate Students Supervised

PhD Students

1. G W Wheeler (1993) *“Protocol Engineering from Estelle Specifications”*
2. R Ulrich (1995) *“Reservoir-Based Resource Management for Slotted High Speed Networks”*
3. H Kabutz (1997) *“Analytical Performance Evaluation of Concurrent Communicating Systems using SDL and Stochastic Petri Nets”*

MSc Students

4. S van Wyk (1980) *“A Generalization of Norton’s Theorem for Multiclass Queueing Networks”*
5. M Helberg (1981) *“Parallel Algorithms”*
6. M Booyens (1982) *“SNAP/L: A Language for Describing Multiclass Queueing Network Models”*
7. J van Dijk (1988) *“An Estelle Compiler”*
8. P Stutz, (1989) *“Office Automation and CoSNet”*
9. A C M Hutchison (1991) *“Modelling Dynamic Routing in Wide Area Networks”*
10. H Donnelly, (1992) *“XSNAP: A Multiclass Queueing Network Solver”*
11. S Donaldson, (1993) *“Complexity of Petri Net Reduction Transformations”*
12. W Knottenbelt, (1996) *“Generalised Markovian Analysis of Timed Transition Systems”*
13. M Mestern, (1998) *“Distributed Analysis of Markov Chains”*
14. J Templemore-Findlayson, (1998) *“A Graphical Representation for the Formal Description Technique Estelle”*

15. P Wall, (1998) *“Bisimulation as a Verification and Validation Technique for Message Sequence Charts”*
16. S Buffer, (1999) *“ROLAND: A Tool for the Realistic Optimisation of Local Access Network Design”*
17. I Davies, (2001) *“Symbolic Techniques for the Performance Analysis of GSPN”*
18. Y Yavwa, (2001) *“Investigating cost-effective communication alternatives for geographically hostile regions”*
19. M Chibesakunda, (2004) *“A Methodology For Analyzing Power Consumption In Wireless Communication Systems”*.
20. L Walters, (2004) *“A Web Browsing Traffic Model for Simulation”*.
21. F Lifson, (2004) *“Specification And Verification Of Systems Using Model Checking And Markov Reward Models”*.
22. O Ryndina, (2005) *“Improving Requirements Engineering: An Enhanced Use Case Modelling and Analysis Method”*.
23. N de Wet, (2005) *“Model Driven Communication Protocol Engineering and Simulation Based Performance Analysis Using UML 2.0”*.
24. J Landman, (2005) *Analytical Models of IP Traffic on UMTS Mobile Networks”*.

**Programme Committee Membership:
International Conferences (last 5 years)**

1. 14th International Conference on Modelling Techniques and Tools for Computer Performance Evaluation (TOOLS2002), April 2002, London.
2. 23th International Conference on Formal Techniques for Networked and Distributed Systems (FORTE 2003, September 2003, Berlin, Germany.
3. 15th International Conference on Modelling Techniques and Tools for Computer Performance Evaluation (TOOLS2003), April 2003, Urbana-Champaign, Illinois, USA, September, 2003.
4. 1st International Conference on Quantitative Evaluation of Systems (QEST) 2004.
5. First International Workshop on Practical Applications of Stochastic Modelling, PASM’04, September 2004, Imperial College, London.
6. Second International Workshop on Practical Applications of Stochastic Modelling PASM’05, July 2005, University of Newcastle upon Tyne, UK.

Publications

Books

1. with F. Bause (1995) "Introduction to Stochastic Petri Net Theory" Vieweg Verlag, Germany in the series *Advanced Studies in Computer Science*, ISBN 3-528-05535-9, 250 pages. Second edition published 2002.

Full length articles in refereed journals

2. with J.W. Graham (1974) "A theorem in the theory of compromise merge methods." *JACM*, **21** (1974), 157–160.
3. with M. Thompson and J.W. Graham (1974) "Queueing theory analysis of a direct access storage device." *Canadian Journal of Operational Research and Information Processing (INFOR)* **12** (1974), 39–54. *1 citation*
4. with J.G. Peters (1975) "Implementation of Samplesort, a minimal storage tree sort." *BIT* **15** (1975), 85–93.
5. with A.E. Krzesinski and P. Teunissen (1979) "Computer performance prediction using multiclass queueing network theory." in *Computer Performance Evaluation*, edited by N. Benwell and published as part of the Advanced Book Programme of the Cranfield Institute of Technology (1979).
6. with A.E. Krzesinski and P. Teunissen (1980) "A queueing model of a time-sliced priority-driven task dispatching algorithm." *IEEE Trans. on Software Engineering*, **SE-6** (1980), 219–225.
7. with A.E. Krzesinski and P. Teunissen (1980) "Incorporating system overhead in queueing network models." *IEEE Trans. on Software Engineering*, **SE-6** (1980), 381–390. *3 citations*
8. with S. van Wyk and A.E. Krzesinski (1982) "A generalisation of Norton's theorem for multiclass queueing networks." *Performance Evaluation*, **2** (1982), 98–107. *8 citations*
9. with M. Booyens (1984) "SNAPL/1: A language to describe and evaluate queueing network models." *Performance Evaluation*, **4** (1984), 171–181. *1 citation*
10. (1986) "A performance model of the OSI communications architecture." *IEEE Trans. on Communications*, **COM-34** (1986), 554–563. *8 citations, 10 reprint requests.*
11. (1990) "A generalised analysis of ARQ protocol performance in a multi-process environment." *Performance Evaluation*, (1990) **11**, 1, 31–44.
12. with J van Dijk (1990) "An Estelle Compiler for a Protocol Development Environment." *South African Computer Journal*, **1** (1990), 23–30. *1 citation*
13. with G Wheeler (1992) "PEW: A tool for the automated performance analysis of protocols" *South African Computer Journal*, **8** (1992), 53 – 58.

14. with F. Bause and M. Sczittnick (1994) "Markovian Analysis of the DQDB MAC Protocol", *South African Computer Journal*, **11** (1994), 47 – 57.
15. with F. Bause and S. Donaldson (1996) "The Complexity of Petri Net Transformations", *South African Computer Journal*, December 1996.
16. (1996) "Software Engineering", *Transactions of the South African Institute of Electrical Engineers*, 87 (3) (1996) p. 88.
17. with R. Ulrich and U. Herzog (1997) "Modelling Buffer Utilisation in Cell-based Networks", *Performance Evaluation*, 706 (1997), 1 – 17.
18. with W. Knottenbelt (1998) "A Performance analyser for the numerical solution of general Markov chains", *South African Computer Journal*, 21 (1998), 34 – 43.
19. with W. Knottenbelt and P.G. Harrison and M.A. Mestern (2000) "A probabilistic dynamic technique for the distributed generation of very large state spaces", *Performance Evaluation*, Volume 39, Issue 1-4, February 2000, 127 – 148.
20. with J Landman (2005) "Delay Analysis of Downlink IP Traffic on UMTS Mobile Networks", To appear in *Performance Evaluation*, 2005.
21. with N. de Wet (2005) Using UML Models for the Performance Analysis of Network Systems. To appear in *Computer Networks*, 2005.
22. with O Ryndina (2005) "Analysis of Structured Use Case Models through Model Checking ", Submitted to *South African Computer Journal*, June 2005.

Refereed papers in published conference proceedings

23. with J.W. Graham (1973) "New sets of linear difference equations for the definition of merge methods." *Proc. 4th South-Eastern Conference on Combinatorics, Graph Theory and Computing*, Boca Raton, Florida (1973), 397–402.
24. with H. Beilner (1976) "Systematic installation management – towards a process of continuous observation and control of computer performance." *Proc. 6th Annual Meeting of the Gesellschaft für Informatik*, Stuttgart, West Germany, (1976), 412–426. *1 citation*
25. with H. Beilner (1976) "A computer installation management methodology." *Proc. European Conference on Computer Performance Evaluation*, London, England, (1976), 357–370.
26. with A.E. Krzesinski and P. Teunissen (1978) "Design of a control system for a timesharing computer." *International Conference on the Performance of Computer Installations*, Stresa, Italy, (1978), 103–114. *1 citation*
27. with S. van Wyk (1982) "Implementation and control of effective management procedures for ICL 2900 series machines." *Proc. 10th Conference of the European Computer Measurement Association*, Munich, West Germany, (1982), 136–149.

28. with, A.E. Krzesinski and P. Teunissen (1982) “Monotoring ICL 2900 series machines for performance management and control.” *Proc. 10th Conference of the European Computer Measurement Association*, Munich, West Germany, (1982), 292–299.
29. with M. Booyens, A.E. Krzesinski, P Teunissen and S. van Wyk (1984) “SNAP: An analytical multiclass queueing network analyser.” *Proc. International Conference on Modelling Techniques and Tools for Performance Analysis*, Paris, France, (1984), 13p. 2 citations
30. (1984) “Analysing the time efficiency of a communication protocol.” *Proc. IVth International Workshop on Protocol Specification, Testing and Verification*, Pocono, USA, (1984), 527–539. 5 citations
31. with J. Engelbrecht and H. Rudin (1985) “Predicting protocol performance from a meta-implementation.” *Proc. Vth International Symposium on Protocol Specification, Testing and Verification*, Toulouse, France, (1985), 349–362. 3 citations
32. (1987) “Protocol Performance using Image Protocols.” *Proc. VIIth International Symposium on Protocol Specification, Testing and Verification*, Zurich, Switzerland, (1987), 321–335.
33. with G Wheeler (1989) “PEW: A protocol engineering workbench.” *Proc. Second International Conference on Formal Description Techniques – FORTE’89*, Vancouver, Canada, (1989), 63–76. 3 citations
34. with A Hutchison (1992) “XWAN: A tool to model the performance of a WAN.” *Proceedings of the International Conference on Modelling Techniques and Tools for Performance Evaluation*, R Pooley and J Hillston (Eds.), Edinburgh, (1992), 361 – 365.
35. with G Wheeler (1993) “Semi-Markovian Analysis of Protocol Performance” *Proc. XIIIth International Symposium on Protocol Specification, Testing and Verification*, Liège, Belgium, (1993), 159–172.
36. with F. Bause, H. Kabutz and P. Kemper (1995) “SDL and Petri Net Performance Analysis of Communicating Systems” *Proc. XVth International Symposium on Protocol Specification, Testing and Verification*, Warsaw, Poland, (1995), 269 – 292.
37. with M. Bütow, M. Mestern and C. Schapiro (1996) “Performance Modelling with the Specification Language SDL”, *Proc. FORTE-PSTV96: XVth International Symposium on Protocol Specification, Testing and Verification*, Kaiserslautern, Germany, 213 – 225.
38. with W. Knottenbelt, M. Mestern and P.G. Harrison (1998) “Probability, Parallelism and the State Space Exploration Problem”, *Proc. Xth Conference on Modelling Techniques and Tools for Performance Evaluation*, R Puigjaner and NN Savino(Eds.), Palma, (1998), 165 – 179.
39. with J. Templemore Findlayson, J-L Raffy and S. Budkowski (1998) “A graphical interface for the Estelle FDT”, *Proc. FORTE-PSTV96: XVIIth International*

Symposium on Protocol Specification, Testing and Verification, Paris, (1998), 213 – 225.

40. with Y. Yavwa (2001) "Investigating cost effective communication systems alternatives in developing regions", *The Electronic Journal on Information Systems in Developing Countries*, EJISDC-ISSN 1681-4835, <http://www.ejisdc.org/>, Vol. 6, December 2001, 19 pages.
41. with I.Davies and W. Knottenbelt (2002) "Symbolic Methods for the State Space Exploration of GSPN Models", *Proc. XIIth Conference on Modelling Techniques and Tools for Performance Evaluation*, T. Field *et al.*, London, (2002), 188 – 199. Springer Verlag, ISBN 3-540-43539-5.
42. with J Landman (2004) "Modelling a DS-CDMA Fading Channel with Bursty Traffic Arrivals", *Proceedings of the 2nd Workshop on Modeling and Optimization in Mobile, Ad Hoc and Wireless networks (WiOpt 2004)*, Published by Springer Verlag, Editors T Basar and M Conit, March 2004, 414–416 published by Springer Verlag.
43. with N de Wet (2004) "Using UML Models for the performance analysis of network systems", *Proceedings of the Workshop on Integrated-reliability with Telecommunications and UML Languages*, IRISA, Rennes France.

Unrefereed and review articles

45. with J.W. Graham (1973) "A survey of sorting activity at Canadian computer installations." *Canadian Datasystems*, (1973), 40 – 41.
46. (1979) "Practical aspects of computer performance modelling." *BEXA 79*, Johannesburg.
47. with A.E. Krzesinski (1981) "Modelling computer communication networks." *Proc. Symposium on Practical Aspects of Data Communications*, CSSA, Johannesburg (1981).
48. (1983) "The need for computer capacity management." *BEXA 83*, Johannesburg.
49. (1986) "What is Computer Science?" Inaugural lecture, University of Cape Town, Number 115 in New Series, May 1986.
50. (1986) "Local Area Networks in Perspective." *Quaestiones Informaticae*, **5** (1986), 11 – 18.
51. (1987) "Modelling communication protocols." *Proc. IFIP WG 7.3 Workshop*, Brussels, Belgium (1987). Updated in *Proc. IFIP WG 7.3 Workshop*, Edinburgh, Scotland, (1990).
52. (1990) "Funding Computer Science Research." Guest Editorial in *South African Computer Journal*, **1**, (1990), 3 – 4.
53. (1993) "Information Technology Research in the EC." Guest Editorial in *South African Computer Journal*, **10**, (1993), 4 – 7.

54. (1995) "Tools for the Development of Concurrent Communicating Systems." TELKOM95, Bi-annual International Telecommunications Conference, March 27 – 29 (1995), Midrand, South Africa.
55. with A. Attieh, M.C. Brady and W. Knottenbelt (1995) "Functional and Temporal Analysis of Concurrent Systems." Protocol Performance Workshop, held in conjunction with the 16th *International Conference on the Theory and Application of Petri Nets*, Turin, Italy, June (1995), 79 – 96.

Selected research reports

54. (1972) "An approach to the optimisation of direct access merge performance", *PhD thesis*, University of Waterloo, Canada, (April 1972), 175 pages. 2 citations
55. with S. van Wyk (1983) "Mean Value Analysis: a collection of the results." *Report ITR 82-14-01*, (1983), 31 pages. 2 citations, 8 reprint requests.
56. with W. Knottenbelt (1996) "A Performance Analyser for the Numerical Solution of General Markov Chains", *Report CS96-01-00*, 20 pages.
57. with A. Shearman and F Lifson (2001) "Knowledge Based Error Diagnosis in GSM Networks", *Report CS01-29-00*, 19 pages.
58. With Oksana Ryndina (2002) "Point to Point Protocol over Ethernet - Overview and SDL Specification", *Report CS02-02-00*, 12 pages.

Invited Colloquium Lectures or Seminars (last 10 years)

IMMD, Universität Erlangen-Nürnberg, Erlangen, June 1995.
 Brandenburgische Technische Universität Cottbus, October 1996.
 IMMD, Universität Erlangen-Nürnberg, Erlangen, November 1996.
 Institut National des Télécommunications, October 2003.
 Eidgenössische Technische Hochschule (ETH), Zurich, October 2003.
 IBM Zurich Research Laboratory (ZRL), Zurich, October 2004.

I have furthermore taken part in the teaching of short courses to industry such as a three day course on multiclass queuing network modelling for the Computer Science Division of Sperry Corporation in the United States during September 1981 as well as the Annual Technology Week of the Department of Computer Science (1994, 1995) and a series of national seminars in 1995 with Americo da Silva from TELKOM, South Africa on High Speed Networks.

Reviewer: Last 5 years

SAIEE (also Associate Editor for Computer and Software Engineering)

Computer Networks

Software Practice and Experience

Performance Evaluation

Journal of Internetworking Research and Experience

IEE Proceedings on Software

FORTE/PSTV03, International Conference on Formal Specification Methods and Protocol Specification, Testing and Verification, October 2003, Berlin, Germany (also PC member)

15th International Conference on Modelling Techniques and Tools for Computer Performance Evaluation (TOOLS2002), April 2002, London, UK (also PC member)

International Conference on Quantitative Evaluation of Systems (QEST). University of Twente, 2004.

30th Annual IEEE Conference on Local Computer Networks, Sydney, 2005

Workshop on the Practical Aspects of Stochastic Modelling (PASM, 2004, 2005

National Foundation for Research Development (NRF) (continuous)