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CURRENT EMPLOYMENT

JAN 2004 – UNIVERSITY OF NEWCASTLE UPON TYNE

DATE SCHOOL OF COMPUTING SCIENCE LECTURER

I am Degree Programme Director and chair of the board of examiners for the MSc in Computing Science and a member of the Distributed Systems and Data Intensive Systems research groups. I sit on the teaching and learning, staff-student and scrutiny committees. I currently teach on a level 3 undergraduate module on Systems Administration (CSC360) and MSc modules on Networks and Web Technologies (CSC845), Computer Environments (BSM802) and Computing for Bioinformatics (CSC853). I have supervised final year undergraduate and MSc projects in a variety of areas including logic puzzles, intron splice site prediction, the simulation of diffusion models, real time cryptography and a performance analysis of PGP.

RESEARCH INTERESTS

My main research interests lie in the field of performance modelling, in particular Markov modelling through queueing theory and stochastic process algebra. I am especially interested in the interactions between components of a model and any structure they impose that may allow more efficient model solution, e.g. product form. I have developed the notion of behavioural independence in Markovian process algebra that supports simple characterisations of many different model reduction approaches, allowing them to be compared and extended in a common framework. The main application of this work has been in the area of distributed systems and more recently Grid computing and secure evoting. Currently this work is supported under an EPSRC funded project.

I am also interested in stochastic process algebra applications in bioinformatics and social informatics. Such systems tend to give rise to extremely large models of a highly regular structure which are ideal for solving by decomposition techniques. I also have interests in software and model visualisation where I have jointly supervised two part-time research students.

PREVIOUS EMPLOYMENT

OCT 1998 - UNIVERSITY OF DURHAM

DEC 2003 DEPARTMENT OF COMPUTER SCIENCE LECTURER

I was responsible for organising departmental research seminar programme and I chaired the departmental IT committee. I was a member of the Research Institute in Software Evolution (formerly the Centre for Software Maintenance) the Distributed Systems Engineering research group (DSE) and the Visualisation Research Group (VRG). I taught on a number of modules including; an MSc module on "Fundamental Principals of Distributed Computing", level 1 modules on "Fundamentals of Computer Science" and "Information Systems", level 2 modules on "Architecture and Networks" and "Concurrency" and a level 3 module on "Performance Engineering".

SEPT 1997 - UNIVERSITY OF EDINBURGH

OCT 1998 - DEPARTMENT OF COMPUTER SCIENCE Research Assistant on EPSRC funded COMPA project investigating product form solutions to performance models expressed in a Markovian process algebra. The principal investigator on COMPA was Dr Jane Hillston.

DEC 1995 - UNIVERSITY OF DURHAM

MAR 1997 DEPARTMENT OF COMPUTER SCIENCE Research Assistant in the BT funded Distributed Centre of Excellence in Software Engineering (DiCE). My own research within this project was in the fields of domain specific languages, end-user programming, software agents and tools for the support of collaborative working. The investigators on DiCE at Durham were Prof. Keith Bennett and Prof. Malcolm Munro.

EDUCATION

1992 - 1997 UNIVERSITY OF NEWCASTLE UPON TYNE DEPARTMENT OF COMPUTING SCIENCE PhD "Performance and Reliability of Distributed Systems" Research involved using queuing theory to model the behaviour of unreliable networks of computers in a number of different architectures. During this period of study I was supported by BT and EPSRC under a CASE studentship and supervised by Prof. Isi Mitrani.

- 1990 1991 UNIVERSITY OF NEWCASTLE UPON TYNE MSc in Computing Science.
- 1987 1990 UNIVERSITY COLLEGE OF NORTH WALES, BANGOR BSc(Jt Hons) Physical Oceanography and Mathematics.

RESEARCH GRANTS

OCT 2005 - DYNAMIC OPERATING POLICIES FOR COMMERCIAL HOSTING ENVIRONMENTS

OCT 2008 EPSRC (£176,886 at Newcastle) EP/C009797/1.

Co-investigator.

This is a joint project between the Universities of Newcastle and Warwick. The PI at Newcastle is Prof Isi Mitrani. The aim of the project is to develop policies for hosting Grid based applications to provide high service quality and efficient resource management. The work plan is based on stochastic modelling, architectures for self management and brokerage and scheduling services with a resource management system.

JAN 2000 - CLARIFI: CLEAR AND RELIABLE INFORMATION FOR INTEGRATION

MAR 2002 EUROPEAN UNION FRAMEWORK V (approx £130K at Durham, €1.8M in total). Scientific officer.

CLARIFI was a collaborative project involving seven partners in four countries. CLARIFI created a broker infrastructure to support the practical application of component-based software engineering in the marketplace. The major focus of CLARIFI at Durham was to develop visual representations to assist in the selection and evaluation of components and systems of components.

MAR 2000 - QWID: QUEUE-WISE DECOMPOSITION IN STOCHASTIC PROCESS ALGEBRA

MAR 2002 EPSRC (£62,203) GR/N01491/01.

Principal investigator.

The aim of the QWiD project was to investigate decomposition techniques found in the literature on queueing theory in a general context. The project was extremely successful producing a number of significant publications and advancing the theory of model decomposition in SPA. QWiD was rated as "tending to outstanding" in the final review.

POSTGRADUATE RESEARCH STUDENTS

SUPERVISED (completed)

- James Witter, *Visualisation and Dynamic Querying of Large Multivariate Data Sets*, MSc (by research), University of Durham, 2004.
- Stuart Charters, *Virtualising Visualisation: A distributed service based approach to visualisation on the Grid*, PhD, University of Durham, 2006 (completed part-time under supervision of M.Munro after 01/01/2004).

EXAMINED (as external examiner)

- Stylianos Papanastasiou, *InvestigatingTCP Performance in Mobile Ad Hoc Networks*, PhD, University of Glasgow, 2006.
- Laurie Young, *Scheduling in a Grid Environment Using High Level Policies*, PhD, Imperial College London, 2005.
- Daniel Spooner, *Performance-Based Middleware for Grid Computing*, PhD, University of Warwick, 2005.
- Liang Zheng, Four state Markov-modulated Poisson Process Queueing for Wireless Application Protocol, MPhil, Heriot Watt University, 2002.

EXAMINED (as internal examiner)

- Michael P. Smith, *Runtime visualisation of object-oriented software*, PhD, University of Durham, 2003.
- John Bailey, *Attack of the Clones: An Investigation into Removing Redundant Source Code*, MSc (by research), University of Durham, 2002.
- John Davey, *Studying the evolution of software through software clustering and concept analysis*, MSc (by research), University of Durham, 2001.

CURRENT (as supervisor)

• Joris Slegers, *Dynamic Operating Policies for Commercial Hosting Environments*, started October 2005.

CURRENT (as member of thesis committee)

- Chris Smith, supervised by Dr Aad van Moorsel, started October 2005.
- John Colquhoun, supervised by Prof Paul Watson, started October 2004.
- Christiaan Lamprecht, supervised by Dr Aad van Moorsel, started October 2004.
- Simon Martin, supervised by Prof Isi Mitrani, started October 2003.

PROFESSIONAL ACTIVITIES

EPSRC PEER REVIEW

I am a member of the EPSRC Peer Review College (until 2009). I served on EPSRC grant review panels in February and April 2005 and I have reviewed a number of grant proposals and individual grant reports.

EVENT ORGANISATION

- Organiser of the Workshop on Grid Performability Modelling and Measurement at the National eScience Centre, March 2006.
- Chair of 21st UK Performance Engineering Workshop (UKPEW) at the University of Newcastle upon Tyne, July 2005.
- General chair of the 2nd Workshop on Practical Application of Stochastic Modelling (PASM), collocated with FM2005, at the University of Newcastle upon Tyne, June 2005.
- Co-chair of the 1st International Workshop on Grid Performability, collocated with CCGrid in Cardiff, March 2005.
- Organiser of the Mini-Workshop on Grid Performability Modelling and Measurement at the UK eScience All Hands Meeting, Nottingham, September 2004.
- Organiser of the Workshop on Grid Performability Modelling and Measurement at the National eScience Centre, March 2004.

- Co-chair of 16th UK Performance Engineering Workshop (UKPEW) at the University of Durham in July 2000.
- Co-chair of 14th UK Performance Engineering Workshop (UKPEW) at the University of Edinburgh, July 1998.

JOURNAL SPECIAL ISSUES

- Guest editor of the *International Journal of Simulation: Systems, Science & Technology*, on "Performance Engineering", volume 7, issue 2, February 2006.
- Guest editor of *Electronic Notes in Theoretical Computer Science*, May 2006.
- Guest editor of *The Computer Journal* on "Grid Performability", volume 48, issue 3, March 2005.
- Guest editor of the *International Journal of Simulation: Systems, Science & Technology*, on "Grid Performance and Dependability", volume 5, issue 5, December 2004
- Guest editor of *IEE Proceedings Software*, on "Performance Engineering", volume 146, issue 1, February 1999.

STEERING COMMITTEE

• UK Performance Engineering Workshop (UKPEW).

PROGRAMME COMMITTEES

- Annual Simulation Symposium (ANSS 2006, 2007).
- IEEE International Workshop on Performance Analysis and Enhancement of Wireless Networks (PAEWN 2006, 2007)
- Performance Modeling, Evaluation, and Optimization of Parallel and Distributed Systems (PMEO-PDS, 2003 to 2006).
- IEEE/ACM Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS, 2004-2006).
- International Conference on High Performance Computing and Communications (HPCC, 2005, 2006).
- Analytical and Stochastic Modelling Techniques and Applications (ASMTA, 2004-2006).
- UK eScience All Hands Meeting (AHM, 2004-2006).
- European Performance Engineering Workshop (EPEW, 2004-2006).
- International Workshop on Performance Evaluation of Networks for Parallel, Cluster and Grid Computing Systems (PEN-PCGCS, 2005, 2006).
- International Symposium on Cluster Computing and the Grid (CCGrid, 2005, 2006).
- Workshop on Practical Applications of Stochastic Modelling (PASM, 2004, 2005).
- International Workshop on Performance Modeling and Analysis of Communication in Parallel, Distributed, and Grid Networks (PMAC-PDG, 2005).
- International Workshop on the Performance Modelling in Wired, Wireless and Mobile Networking and Computing (2005).
- ACM International Workshop on Performance Evaluation of Wireless Ad Hoc, Sensor, and Ubiquitous Networks (PE-WASUN, 2005)
- IFIP Performance Modelling and Evaluation of Heterogeneous Networks (HETNETS, 2003).
- ACM/IFIP International Conference of Performance Modelling Techniques and Tools (TOOLS, 2002).
- IEEE Workshop on Visualisation of Software for Understanding and Analysis (VISSOFT, 2002).

PAPER REVIEWING

I have reviewed papers for several journals, including Performance Evaluation, The Computer Journal, IEE Proceedings – Communications, IEE Proceedings – Computers and Digital Techniques, IEE Proceedings – Software, IEE Electronics Letters, Simulation Practice and Theory, The International Journal of Simulation: Systems, Science & Technology, BMC Genomics, and Mathematical Methods in the Applied Sciences. I have also reviewed papers for several other international workshops and conferences.

BOOK CHAPTERS

- [1] N. Thomas and I. Mitrani, *Routing among different nodes*, in: Quantitative Methods in Parallel Systems, Springer-Verlag, 1995.
- [2] A. Argent-Katwala, J. Bradley, N. Geisweiller, S. Gilmore, N. Thomas, *Tools for Performance Modelling of Wireless network protocols*, in: G. Min, Y. Pan, P. Fan (eds.) Modeling and Simulation of Wireless Networks: Analysis, Evaluation and Enhancement of QoS for Wireless Multimedia, Nova Science, *to appear*.

JOURNAL PAPERS

- [3] N. Thomas, *Approximation in non-product form multiple queue systems*, Future Generation Computer Systems, **22**(7), pp. 820-827, 2006.
- [4] C. Lamprecht, A. van Moorsel, P. Tomlinson, N. Thomas, *Investigating the efficiency of cryptographic algorithms in online transactions*, International Journal of Simulation: Systems, Science and Technology, **7**(2), pp. 63-75, 2006.
- [5] S. Jarvis, N. Thomas and A. van Moorsel, *Open Issues in Grid Performability*, International Journal of Simulation: Systems, Science and Technology, **5**(5), pp. 3-12, 2004.
- [6] N. Thomas, J. Bradley and W. Knottenbelt, Stochastic Analysis of Scheduling Strategies in a Grid-based Resource Model, IEE Proceedings – Software, 151(5), pp. 232-239, 2004.
- [7] N. Thomas, J. Bradley and D. Thornley, An approximate solution of PEPA models using component substitution, IEE Proceedings Computers and Digital Techniques, **150**(2), pp. 67-74, 2003.
- [8] J. Hillston and N. Thomas, *Product Form Solution for a class of PEPA Models*, Performance Evaluation, **35**(3-4), pp. 171-192, 1999.
- [9] G. Clark, S. Gilmore, J. Hillston and N. Thomas, *Experiences of the PEPA Performance Modelling Tools*, IEE Proceedings Software, 146(1), pp. 11-20, 1999.

INTERNATIONAL CONFERENCE AND WORKSHOP PAPERS

- [10] N. Thomas, *Modelling job allocation where service duration is unknown*, in: Proceedings of 4th IEEE International Workshop on Performance Modeling, Evaluation and Optimization of Parallel and Distributed Systems, IEEE Computer Society, 2006.
- [11] J. Bradley, S. Gilmore and N. Thomas, *Performance analysis of Stochastic Process Algebra models using Stochastic Simulation*, in: Proceedings of 4th IEEE International Workshop on Performance Modeling, Evaluation and Optimization of Parallel and Distributed Systems, IEEE Computer Society, 2006.
- [12] J. Bradley, S. Gilmore and N. Thomas, *How Synchronisation Strategy Approximation in PEPA Implementations affects Passage Time Performance Results*, in: Proceedings of the 1st European Performance Engineering Workshop, LNCS 3236, pp. 128-142, Springer-Verlag, 2004.
- [13] N. Thomas, Performability of a secure electronic voting scheme, in: Proceedings of the 1st Workshop on Practical Application of Stochastic Modelling, Electronic Notes in Theoretical Computer Science, vol. 128, Elsevier, 2004.
- [14] S. Charters, N. Thomas and M. Munro, *The end of the line for Software Visualisation?*, Proceedings of 2nd IEEE Workshop on Visualizing Software For Analysis and Understanding, VISSOFT 2003, IEEE Computer Society, 2003.
- [15] N. Thomas, *Product form over on-off components in PEPA*, in: Proceedings of 17th European Simulation Multiconference, SCS Publishers, 2003.
- [16] N. Thomas, D. Thornley and H. Zatschler, Approximate solution of a class of queueing networks with breakdowns, in: Proceedings of 17th European Simulation Multiconference, SCS Publishers, 2003.
- [17] N. Thomas, Approximation in non-product form multiple queue systems, in: Proceedings of 2nd IEEE International Workshop on Performance Modeling, Evaluation and Optimization of Parallel and Distributed Systems, IEEE Computer Society, 2003.

- [18] P. Brereton, S. Linkman, N. Thomas, J. Bøegh and S. de Panfilis, Software Components enabling a mass market, in: Proceedings of STEP 2002, IEEE Computer Society, 2003.
- [19] S. Charters, C. Knight, M. Munro and N. Thomas, Visualisation for Informed Decision Making; From Code to Components, in: Proceedings of Workshop on Software Engineering Decision Support, 14th International Conference on Software Engineering and Knowledge Engineering, ACM Press, 2002.
- [20] N. Thomas, J. Witter and A. Pemble, *Visualisation of Software Component Selection* (tool demonstration), in: Proceedings of the IEEE 1st International Workshop on Visualizing Software for Understanding and Analysis, IEEE Computer Society, 2002.
- [21] S. Charters, N. Thomas and M. Munro, *Component City* (tool demonstration), in: Proceedings of the IEEE 1st International Workshop on Visualizing Software for Understanding and Analysis, IEEE Computer Society, 2002.
- [22] N. Thomas and J. Bradley, *Two solution methods for models of parallel queues*, in: Proceedings of 14th European Simulation Multiconference, SCS Publishers, 2001.
- [23] J. Bradley and N. Thomas, Putting Quality of Service into a network by making the traffic Markovian, in: Proceedings of 14th European Simulation Multiconference, SCS Publishers, 2001.
- [24] N. Thomas, M. Munro, P. King and R. Pooley, *Visual representation of stochastic process algebra models*, in: Proceedings of 2nd International Workshop on Software and Performance, ACM Press, 2000.
- [25] N. Thomas and J. Bradley, *Decomposing models of parallel queues*, in: Proceedings of the 4th IFIP International Workshop on Queueing Networks with Finite Capacity, Ilkley, 2000.
- [26] N. Thomas and J. Bradley, Approximating variance in non-product form decomposed models, in: Proceedings of the 8th International Workshop on Process Algebra and Performance Modelling, ICALP Workshops 2000, Carleton Scientific Press, 2000.
- [27] J. Hillston and N. Thomas, A Syntactic Analysis of Reversible PEPA Processes, in: Proceedings of 6th International Workshop on Process Algebra and Performance Modelling, Nice, 1998.
- [28] N. Thomas and S. Gilmore, Applying Quasi-Separability to Markovian Process Algebra, in: Proceedings of 6th International Workshop on Process Algebra and Performance Modelling, Nice, 1998.
- [29] N. Thomas and I. Mitrani, *Approximate Solution of a Pipeline with Server Vacations*, in: Proceedings of 12th European Simulation Multiconference, SCS Publishers, 1998.
- [30] N. Thomas and I. Mitrani, *Routing Among Different Nodes Where Servers Breakdown Without Losing Jobs*, in: Proceedings of 1st IEEE International Computer Performance and Dependability Symposium, IEEE Computer Society, 1995.

UK CONFERENCE AND WORKSHOP PAPERS

- [31] J. Slegers, C. Smith, I. Mitrani, A. van Moorsel and N. Thomas, *Dynamic Operating Policies for Commercial Hosting Environments* (poster presentation), in: Proceedings of the 4th UK e-Science All Hands Meeting, Nottingham, 2006.
- [32] S. Dick and N. Thomas, *Performance Analysis of PGP*, in: Proceedings of the 22nd Annual UK Peformance Engineering Workshop, Bournemouth University, 2006.
- [33] N. Thomas, *Modelling job allocation where service duration is unknown*, 4th Workshop on Process Algebra and Stochastically Timed Activities, University of Edinburgh, 2005.
- [34] N. Thomas, J. Bradley and W. Knottenbelt, Ants, Agents and Product Form, 3rd Workshop on Process Algebra and Stochastically Timed Activities, Edinburgh, National e-Science Centre, 2004.
- [35] N. Thomas, J. Bradley and W. Knottenbelt, *Performance of a semi blind service scheduler*, in; Proceedings of the 2nd UK e-Science All Hands Meeting, Nottingham, 2004.
- [36] N. Thomas, J. Bradley and W. Knottenbelt, Semi-blind scheduling in a finite capacity system, in: Proceedings of the 20th Annual UK Performance Engineering Workshop, University of Bradford, 2004.
- [37] N. Thomas, *Towards an alternative characterisation of Boucherie product form*, 2nd Workshop on Process Algebra and Stochastically Timed Activities, National e-Science Centre, Edinburgh, 2003.
- [38] N. Thomas, *The effect of information latency on performance*, in: Proceedings of the 19th UK Performance Engineering Workshop, University of Warwick, 2003.

- [39] D. Thornley, H. Zatschler and N. Thomas, A novel approximated joint activity transition structure in a tandem feedback unreliable server queue, in: Proceedings of the 19th UK Performance Engineering Workshop, University of Warwick, 2003.
- [40] N. Thomas, A product form over components in stochastic process algebra, in: Proceedings of 6th UK Simulation Society Conference, University of Cambridge, 2003.
- [41] N. Thomas, *Behavioural independence and control in PEPA*, 1st Workshop on Process Algebra and Stochastically Timed Activities, National e-Science Centre, Edinburgh, 2002.
- [42] N. Thomas, J. Bradley and D. Thornley, An approximate solution of PEPA models using component substitution, in: Proceedings of the 18th UK Performance Engineering Workshop, University of Glasgow, 2002.
- [43] N. Thomas and J. Bradley, *Terminating processes in PEPA*, in: Proceedings of 17th UK Performance Engineering Workshop, University of Leeds, 2001.
- [44] J. Bradley and N. Thomas, *Constructing a Partial Order for Performance Measures*, in: Proceedings of the 16th UK Performance Engineering Workshop, University of Durham, 2000.
- [45] N. Thomas, M. Munro, P. King and R. Pooley, *Visualisation for model comprehension*, in: Proceedings of the 16th UK Performance Engineering Workshop, University of Durham, 2000.
- [46] N. Thomas, *Extending Quasi-Separability*, in: Proceedings of 15th UK Performance Engineering Workshop, University of Bristol, 1999.
- [47] G. Clark, S. Gilmore, J. Hillston and N. Thomas, *Experiences of the PEPA Performance Modelling Tools*, in: Proceedings of 14th UK Performance Engineering Workshop, University of Edinburgh, 1998
- [48] N. Thomas and J. Hillston, *Markovian Queueing Systems modelled with PEPA*, in: Proceedings of 14th UK Performance Engineering Workshop, University of Edinburgh, 1998.

TECHNICAL REPORTS

- [49] N. Thomas, Challenges and Opportunities in Grid Performability, Technical Report, CS-TR: 842, School of Computing Science, University of Newcastle upon Tyne, 2004.
- [50] N. Thomas, *Behavioural Independence and Control in Markovian Process Algebra*, Technical Report 2002/1, Department of Computer Science, University of Durham, 2002.
- [51] J. Witter, N. Thomas, M. Munro, A Visual Query Tool for Computer Multivariate Data, Technical Report 2001/10, Department of Computer Science, University of Durham, 2001.
- [52] N. Thomas and J. Bradley, *Towards reliable software performance modelling using stochastic process algebra*, Technical Report 2001/1, Department of Computer Science, University of Durham, 2001.
- [53] P. Periorellis and N. Thomas *Mutuality and the CLARiFi Component Broker*, Technical Report 2000/3, Department of Computer Science, University of Durham, 2000.
- [54] N. Thomas and I. Mitrani, A Manufacturing Production Line with Service Interruptions, Technical Report ECS-LFCS-98-388, Laboratory for Foundations of Computer Science, University of Edinburgh, 1998.
- [55] N. Thomas and J. Hillston, Using Markovian Process Algebra to Specify Interactions in Queueing Systems, Technical Report ECS-LFCS-97-373, Laboratory for Foundations of Computer Science, University of Edinburgh, 1997.
- [56] N. Thomas and I. Mitrani, Routing Among Servers with Breakdowns and Retained Queues, Technical Report CS-TR: 527, Department of Computing Science, University of Newcastle upon Tyne, 1995.

EDITORIALS

- [57] N. Thomas, J. Bradley and W.J. Knottenbelt (eds.), *Proceedings of the 2nd International Workshop on Practical Applications of Stochastic Modelling*, Electronic Notes in Theoretical Computer Science, **151**(3), 2006.
- [58] N. Thomas, *Special Issue Editorial: Performance Engineering*, International Journal of Simulation: Systems, Science and Technology, **7**(1), 2006.
- [59] N. Thomas (ed.), Proceedings of the 21st UK Performance Engineering Workshop, School of Computing Science Technical Report, CS-TR: 916, University of Newcastle, 2005.
- [60] N. Thomas, Special Issue Editorial: Grid Performability, The Computer Journal, 48(3), 2005.
- [61] N. Thomas, Special Issue Editorial: Grid Performance and Dependability, International Journal

of Simulation: Systems, Science and Technology, **5**(5), 2004.

- [62] N. Thomas and J. Bradley (eds.), *Proceedings of the 16th UK Performance Engineering Workshop*, University of Durham, 2000.
- [63] N. Thomas, *Performance Engineering*, IEE Proceedings Software, 146(1), 1999.
- [64] N. Thomas and R.J. Pooley (eds.), *Proceedings of the 14th UK Performance Engineering Workshop*, University of Edinburgh, 1998.

INVITED PRESENTATIONS

- N. Thomas, *Scheduling, Workflow and Job Management*, invited lecture MSc/Diploma in e-Science at University of Edinburgh, National e-Science Centre, October 2005.
- N. Thomas, J. Bradley and W. Knottenbelt, *Stochastic Analysis of Scheduling Strategies in a Grid-based Resource Model*, Department Seminar, Imperial College London, 2005.
- N. Thomas, *Model Decomposition*, presentation to the High Performance Computing Group, Department of Computer Science, University of Warwick, February 2003.
- N. Thomas, *Behavioural independence and control in PEPA*, Departmental Seminar, Imperial College London, November 2001.