EURANDOM

Annual Report 2008

Mission statement

The mission of EURANDOM is to foster research in the stochastic sciences and their applications.
It achieves this mission:

by recruiting and training talented young researchers and helping them to find their way to tenured positions in academia and industry;
by carrying out and facilitating research through postdoctoral and graduate appointments, visitor exchange and workshops;
and by taking initiatives for collaborative research at the European level

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1. INTRODUCTION

January - June 2008

General News

January 1, 2008 the organizational position of EURANDOM in the TU/e has been changed. The institute became organizationally embedded into the Department of Mathematics & Computer Science. Our location (Laplace building) will not change until the moving of the Department of Mathematics & Computer Science into a new building in 2011.

We are pleased that EURANDOM is able to continue the research activities and the workshop and visitor programmes at a scale that is virtually equal to the present one. We aim to maintain, and possibly even strengthen, the ties with the senior fellows and research fellows of other universities.
The board of the foundation EURANDOM as well as the directors of the institute will continue their efforts for additional funding. The institute is among other things involved in a proposal for a stochastics cluster with EURANDOM as central node.

EURANDOM is now officially recognised by the CNRS (Centre National de Recherche Scientifique) in France as UMI (Unité Mixte Internationale). This is an international joint unit through which CNRS is consolidating its international position in the field of mathematics, facilitating researcher mobility and creating a vast network of growing partnerships.

August 26 - 28, 2008 we celebrated our 10th Anniversary with the conference "A Random Tour through a Decade of Research" Also on the occasion of the 10th anniversary we organised an "Unlikely evening with EURANDOM" with lectures for a broader audience. During this evening the audience stepped into the world of chance and learned that mathematicians have a lot to say about (and maybe even influence) CHANCE. Wim Schoutens gave a very interesting (and timely!) lecture about credit risk; Remco van der Hofstad discussed fascinating paradoxes involving probabilities; and several staff members discussed problems which had been submitted to our website by members of the audience in the weeks before the Unlikely Evening. The various activities also generated some attention in the media.

Board and Scientific council

June 24 and December 12, 2008 the Board of EURANDOM had a meeting and the Scientifc Council met on August 26, 2008. On all agendas were issues concerning funding and the stochastics cluster proposal with EURANDOM as central node.

COST Action

In the fall of 2008 EURANDOM became a member of the COST Action MP0801 "Physics of Competition and Conflicts". This Action "will promote discussion and research across the physical and sociological disciplinary boundaries by providing a platform from which the participating researchers can develop important, new, and substantial research initiatives aimed at tackling key trans-disciplinary issues. Overall the Action will provide a unique forum for phsysicists and mathematical scientists to share leading edge knowledge, experience, and build up a common language with economists, social scientists, industry and government".

Senior Fellows

January 1, 2008 a new senior fellow started in the SIM group: Prof.dr.ir. G. (Geurt) Jongbloed from Delft University of Technology. His research interests are: inverse problems, shape restricted statistical inference, incomplete data problems, nonparametric estimation, computational statistics, asymptotic statistics, applications of statistics in biology, medicine, computer science, business, river studies, and earth sciences.

In 2008 we said goodbye to Prof.dr. R. (Richard) Gill (Leiden University, The Netherlands), and to Dr. A. (Allessandro) di Bucchianico (TU/e, Eindhoven, The Netherlands) who both acted for 10 years as senior fellows of the SIM group. At the end of the year we also said farewell to senior fellow Prof.dr. B.J.M. (Bas) Werker (Tilburg University, The Netherlands). We thank them all for their valuable contributions.

August 1, 2008 Bert Zwart (CWI, The Netherlands) joined the QPA group as senior fellow. His research interests are probability and stochastic networks. In December 2008, Prof.dr. I.J.B.F. (Ivo) Adan has been appointed as professor at the University of Amsterdam, The Netherlands.

Two new senior fellows will start in 2009; in the RSS group: Dr. V. (Vladas) Sidoravicius from CWI (Amsterdam, The Netherlands). His research interests are probability theory and stochastic processes (appointed parttime professor at UL end 2008). In the MVR group Dr. R. (Roger) Laeven (Tilburg University, The Netherlands). His research interests are Probability and Mathematical Statistics, (Micro) Economic Theory, Actuarial Science and Quantitative Finance.

New People in 2008

QPA
Ahmad Al Hanbali (December)
Stelios Bekiros (February May)
Yoav Kerner (February)
Kamil Kosinski (October)
Liqiang Liu (February)
Vika Masol (January 28-May 1)-(from Dec.07 she was In Natura)

RSS
Anne Fey-den Boer (May and June)
Robert Fitzner (September)
Artem Sapozhnikov (November)
Lihu Xu (October)

SIM
Shota Gugushvili (January)
Mikhail Langovoy (October)
Alexander Ledovskikh (September)

People who left

QPA
Gergeley Mincsovics
Balakrishna Prabhu
Vika Masol
Stelios Bekiros

RSS
Sébastien Blachère
Tobias Müller
Wouter Kager
Cristian Spitoni
Markus Heydenreich
Anne Fey
Nicolas Pétrélis

SIM
Ambedkar Dukkipati
Dmitriy Danilov
Guangming Pan

Alumni News

Research fellows

At the beginning of 2008 we (re)appointed seven former EURANDOM postdocs as Research Fellow: Cristian Giardinà, Peter Grünwald, Bernd Heidergott, Wouter Kager, Johan van Leeuwaarden, Nelli Litvak and Francesca Nardi. Through these appointments we hope to consolidate our links to universities in The Netherlands. Their contributions (co-organising workshops, giving courses etc.) help increasing the visibility and level of activities at our institute.

Awards

Christian Gromoll won the prestigious Best publication award, an award of the INFORMS Applied Probability Society for outstanding contributions to the field of applied probability. The award is accompanied by a plaque and a honorarium and is given once every two years.

In August 2008 Prof.dr. A.P. (Bert) Zwart obtained a VIDI-grant from NWO.
At the INFORMS conference in Washington Bert Zwart received the Erlang Prize. This is an award for the best researcher under the age of 36 in the area of applied probability. He is the first person working at a non-American institute to receive this prize.
Prof.dr. R.W. (Remco) van der Hofstad received an NWO VICI-grant.

Kamil Kosinski received an award for the best Master thesis by the Polish Academy of Science and Tobias Müller obtained an NWO VENI-grant.

At the 9th INFORMS Telecommunications Conference *Telecommunications Modelling, Policy, and Technology* (March 27 - 29, 2008, Robert H. Smith School of Business, University of Maryland, College Park, MD, USA) the Doctoral Dissertation Award for Operations Research in Telecommunications 2008 has been awarded to Johan van Leeuwaarden. The award aims to recognize outstanding scholarly achievements of young people in the field.

New jobs

Akira Sakai started a new position at Hokkaido University. After having spent some time in Sweden, Nadia Lalam is now back in Paris, working for the AXA insurance company (Department of Life Operations). Grégory Maillard obtained a "Maître de conférence" position in Marseille (CMI LATP).

Research fellow Peter Grünwald has been appointed Professor in Statistical Learning at the Mathematical Institute of Leiden University, The Netherlands.

In the RSS group former post-doc Wouter Kager has been appointed as Research fellow as of September 1, 2008 and former PhD-student Maria Vlasiou will become Research fellow in the QPA group as of January 1, 2009.

Alumni meeting

August 26, 2008 when we celebrated our 10th Anniversary, we also scheduled an Alumni-meeting. We had an interesting discussion with approximately 20 Alumni about the future of Mathematics, rounded off with a dinner.

Annual Excursion

This year we organised the Annual Excursion in Eindhoven. June 25, 2008 we brought a visit to the PSV stadium, we played jeu-de-boules and 'beugelen' at the PVOC - the meeting center of the TU/e staff association -where we also had a very nice BBQ.

PhD defences

March 18, 2008 Anne Fey-den Boer successfully defended her thesis *Sandpile models: The infinite volume model, Zhang's model and limiting shapes* at the Vrije Universiteit, Amsterdam.

November 3, 2008 Gergely Mincsovics defended his PhD thesis "Studies on tactical capacity planning with contingent capacities". He is now working at TOMTOM, Eindhoven, The Netherlands.

November 5, 2008, Markus Heydenreich defended his PhD thesis "A lace-expansion analysis of random spatial models". The full text of his thesis is available for download on his website. Markus is now working at the Vrije Universiteit, Amsterdam, The Netherlands.

2. THE INSTITUTE

2.1. Management

EURANDOM is a foundation with the mission to enhance scientific research in statistics, probability and stochastic operations research and its applications in Europe. To realise this goal the foundation has established a research institute with the same name.

The **Board** of the foundation consists of:

- Professor dr. F.A. van der Duyn Schouten (member/treasurer until 24-06-2008, since that date chair/treasurer).
- Professor dr.ir. C.J. van Duijn (member)
- Professor dr.ir. G. van Oortmerssen (member since 24-06-2008)

Directors

Professor dr.ir. O.J. Boxma (Eindhoven University of Technology & EURANDOM), scientific director; Drs. C.M.M. Cantrijn, managing director.

2.2. Scientific Council

EURANDOM has a Scientific Council, which advises the board and the directors on the scientific programme and on strategic research issues. The following scientists serve as member of the Scientific Council:

- Professor S. Asmussen (Aarhus University, Sweden)
- Professor F. Baccelli (École Normale Supérieure, Paris, France) (until July 2008)
- Professor J. Beirlant (KU Leuven, Belgium)
- Professor E. Bolthausen (University of Zürich, Switzerland) (until July 2008)
- Professor S. Borst (Eindhoven University of Technology and Lucent, Murray Hill, USA)
- Professor D. Dawson - Chair (Carleton University, Ottawa & McGill University, Montreal, Canada)
- Professor F. Delbaen (Eidgenössische Technische Hochschule Zürich, Switzerland)
- Professor A. Frigessi (University of Oslo, Norway)
- Professor P. Green (University of Bristol, United Kingdom)
- Professor A. Greven (Friedrich-Alexander Universität, Erlangen-Nürnberg, Germany)
- Professor P. Hall (Australian National University, Canberra, Australia)
- Professor P. Massart (Université Paris Sud XI, Orsay, France) (until July 2008)
- Professor Ph. Robert (Centre de Recherche INRIA Paris-Rocquencourt) (from July 2008)
- Professor V. Schmidt (Ulm University, Germany)
- Professor V. Sidoravicius (Centrum voor Wiskunde en Informatica (CWI), The Netherlands) (from July 2008)
- Professor A.W. van der Vaart (Vrije Universiteit Amsterdam, The Netherlands) (from July 2008)
- Professor N. Veraverbeke (Hasselt University, Diepenbeek, Belgium)

The scientific council of EURANDOM met on August 26, 2008. Main item on the agenda: the state of affairs with regard to the future research structure of EURANDOM.

2.3. Senior Fellows and Steering Committees

The research of EURANDOM is structured according to three programmes. Each programme is led by senior scientists who supervise the programme and provide guidance to the research of the postdoctoral fellows (PDs) and graduate students (PhDs). The activities in each programme are overseen by an international steering committee.

Queueing and Performance Analysis (QPA)

Senior fellows

Professor. I.J.B.F. Adan (Eindhoven University of Technology)
Professor R.J. Boucherie (University of Twente)
Dr. N.P. Dellaert (Eindhoven University of Technology)
Professor G.J.A.N. van Houtum (Eindhoven University of Technology)
Professor M.R.H. Mandjes (CWI & University of Amsterdam)
Professor W. Schoutens (KU Leuven, Belgium)
Professor J. Teugels (KU Leuven, Belgium)
Professor B.J.M. Werker (Tilburg University) – September 2007 until December 2008
Professor A.P. Zwart (CWI) - since August 2008

Steering committee

Professor F. Baccelli (École Normale Supérieure, Paris, France)
Professor S.G. Foss (Heriot Watt University, Edinburgh, United Kingdom)
Professor O. Kella (The Hebrew University of Jerusalem, Israel)
Professor F.P. Kelly - Chair (Cambridge University, United Kingdom)
Professor G. Koole (VU University, Amsterdam)
Professor J. Wessels (Eindhoven University of Technology)

Random Spatial Structures (RSS)

Senior fellows

Professor R.W. van der Hofstad (Eindhoven University of Technology)
Professor W.Th.F. den Hollander (Leiden University)

Steering committee

Professor E. Bolthausen (Universität Zürich, Switzerland)
Professor A. Bovier (Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany)
Professor A.C.D. van Enter (University of Groningen)
Professor G.R. Grimmett (University of Cambridge, United Kingdom)
Professor C. Maes (KU Leuven, Belgium)
Professor R.W.J. Meester (VU University, Amsterdam)
Professor E. Olivieri (Università degli Studi di Roma 'Tor Vergata', Italy)
Professor V. Sidoravicius (Instituto de Matématica Pura e Aplicada, Rio de Janeiro, Brasil)
Professor J. Steif (Chalmers Tekniska Högskola, Gothenborg, Sweden)

Statistical Information and Modelling (SIM)

Senior fellows

Dr. A. di Bucchianico -until September 2008- (Eindhoven University of Technology)
Professor P.L. Davies (Eindhoven University of Technology & Universität Duisburg-Essen, Germany)
Professor R.D. Gill (Leiden University)
Professor M.C.M. de Gunst (VU University, Amsterdam)
Professor G. Jongbloed (Delft Technical University)
Professor C.A.J. Klaassen (University of Amsterdam)
Dr. M.N.M. van Lieshout (CWI, Amsterdam)

Steering committee

Professor P. Donelly (University of Oxford, United Kingdom)
Professor U. Gather (Universität Dortmund, Germany)
Professor P. Green (University of Bristol, United Kingdom)
Professor M. Newby (City University, London, United Kingdom)
Professor S. Tavaré (University of Southern California, Los Angeles, United States of America)

Professor A. Tsybakov (Université Paris VI, France)

In addition to these programmes one project is running since the beginning of 2006:

Integrated Batteries (*i*-BAT)
The research is guided by professor P.H.L. Notten (Philips Research Laboratories, Eindhoven, The Netherlands)

2.4. Scientific Staff

The junior scientific staff of EURANDOM consists of Postdocs (PDs) with appointments from 6 months up to 2-3 years; PhD-students (PhDs) with appointments of 4 years and research fellows with part-time 1–year appointments.

During the year 28 junior researchers were (co-)financed by external funds, from which:

In natura (13):

NWO-VIDI grant Professor R.W. van der Hofstad: 1 PhD (until December) via an appointment at the Department of Mathematics and Computer Science, Eindhoven University of Technology (Heydenreich until November 2008);
NWO-VICI grant Professor R.J.W. Meester: 1 PhD via an appointment at the VU University, Amsterdam (Fey until May 1, 2008);
NWO-Open Competition grant Professor W.Th.F. den Hollander: 1 PD via an appointment at Leiden University (Spitoni until November 1);
Joint employment with KU Leuven: 1 PhD (Guillaume)
4 PhDs of the Department of Technology Management, part-time (since May 2007; Mincsovics defended his PhD in November 2008);
4 PhDs of the Department of Mathematics and Computer Science, part-time (Boon, Fitzner, Van de Ven, and Van Wijk)
Philips contract: 1 PhD (Beekhuizen).

NWO and Industry (5):

1 PhD on a VC grant since October 2008 (Kosinski)
1 PD on an NWO OC grant since December 2008; part of a 3-year grant together with CWI and Twente University (Al Hanbali)
3 postdoc positions on the extended NWO-BRG grant (spread over 5 persons: Cheliotis, Blachère, Müller, Xu and Sapozhnikov)

Other (10):

Philips-EET contract: 1 PD: Danilov until September; Lyedovskikh since September.
EIB: 1 PD Bekiros, February 1 until May 13 and Jönsson since November 2008; in the period November to February and May to November research capacity was taken from KU Leuven: Masol, PD, and Van Damme, PhD.
Falcon: 1 PD since February 1 Liu.
Marie Curie Intra-European Fellowship: 1 PD until November 2008 Jönsson.
Appointment on BRICKS grant via Department of Mathematics and Computer Science, Eindhoven University of Technology: 1 PD Löpker until July 2008; since 01-07-2008 joint - 1/3 - appointment with the Department of Mathematics and Computer Science.
Joint employment -1/3- with the Department of Mathematics and Computer Science (NET-REFOUND): 1 PD Shneer (since 01-03-2008)
Joint appointment with the Department of Mathematics and Computer Science and the Department of Industrial Engineering and Innovation Science, Eindhoven University of Technology: 1 PhD Bruin.
Joint employment with CWI & Department of Mathematics and Computer Science: 1 PD May 2007 until April 2008 Prabhu.
Joint employment with University of Amsterdam: 1 PhD Ivanovs.

On December 31, 2008, 29 researchers (PDs and PhDs) were working at EURANDOM.

Queueing and Performance Analysis

PDs

Ahmad Al Hanbali (since December 1)
Stelios Bekiros (February – May 2008)
Brian Fralix
Henrik Jönsson
Yoav Kerner (since February 1)
Liqiang Liu (since February 1)
Andreas Löpker
Vika Masol (January 28 - until May 1)
Balakrishna Prabhu (May 2007 – April 2008)
Vsevolod Shneer

PhDs

Paul Beekhuizen
Marko Boon
Josine Bruin
Çağdas Büyükkaramikli
Florence Guillaume
Jevgenijs Ivanovs
Kamil Kosinski (since October 2008)
Gergely Mincsovics (May 2007 – October 2008)
Ingrid Reijnen-Koens
Peter van de Ven
Ingrid Vliegen
Sandra van Wijk

Research Fellows

Bernd Heidergott (VU University, Amsterdam)
Johan van Leeuwaarden (Eindhoven University of Technology)
Nelli Litvak (University of Twente)

Random Spatial Structures

PDs

Sébastien Blachère (until September)
Dimitris Cheliotis
Anne Fey (May and June)
Wouter Kager (until March)
Tobias Müller (until Octber 25)
Nicolas Pétrélis (until February 1)
Artem Sapozhnikov (since November)
Cristian Spitoni (until November 1)
Lihu Xu (since October)

PhDs

Anne Fey-den Boer (March 2004 – August 2008)
Robert Fitzner
Markus Heydenreich (October 2004 – September 2008)

Research Fellows

Cristian Giardinà (Eindhoven University of Technology)
Francesca Nardi (Eindhoven University of Technology)
Wouter Kager (Vrije Universiteit)

Statistical Information and Modelling

PDs

Ambedkar Dukkipati (April 2007 – April 2008)
Shota Gugushvili (from January 2008)
Efang Kong (January 2007 – January 2009)
Guangming Pan (July 2007 – July 2008)
Mikhail Langovoy (since October 1)

PhDs

Research Fellows

Peter Grünwald (CWI Amsterdam)

i-BAT

PD

Dmitriy Danilov (May 2006 – September 2008)
Alexander Ledovskikh (since September 1)

For details on the work of the researchers, see Chapter 3. For more information about their publications, see Chapter 4, Section 4.1 and 4.2.

2.5. Administrative Support

Mrs. M.E.J.G.H. (Marlies) Brangers - management assistant (0,9 fte)
Mrs. L. (Lucienne) Coolen-van Will - workshop officer (0,9 fte)
Drs. J.J. (Jonelleke) Kamperman - personnel officer and policy assistance (0,8 fte) – since July for 0,5 on secondment at the department of Mathematics and Computer Science and for 0,2 on leave
Mrs. P.M. (Patty) Koorn - administrative officer (0,5 fte)
Ms. E. (Elisa) Mariani - temporary personnel officer and policy assistance (0,8 fte) until April because of maternity leave of J. Kamperman.

During 2008 41 reseachers worked at EURANDOM. A total of 19,6 fte was employed by Eindhoven University of Technology, EURANDOM, including the managing director and the support staff, not included the scientific director and senior fellows. Furthermore, EURANDOM contributed to several appointments elsewhere (Shneer, Löoker, Masol and Van Damme, Prabhu)

In addition 18 senior scientists were associated with EURANDOM as senior fellow and 7 junior scientists were associated as research fellow.

In 2008 13 researchers started to work at EURANDOM, 14 researchers left EURANDOM.

3. RESEARCH PROGRAMMES

3.1. Queueing and Performance Analysis (QPA)

Senior fellows for this programme are
- Ivo Adan (Eindhoven University of Technology),
- Richard Boucherie (University of Twente),
- Nico Dellaert (Eindhoven University of Technology),
- Geert-Jan van Houtum (Eindhoven University of Technology),
- Michel Mandjes (CWI & University of Amsterdam),
- Bert Zwart (CWI)

Former postdocs
- Bernd Heidergott
- Johan van Leeuwaarden
- Nelli Litvak

are associated to the QPA programme as research fellows.

The goal of this programme is to give a strong impetus to the analysis of queueing systems and their applicability to the performance analysis of computer, communication, and production networks, and to the analysis of multivariate risk models. The programme consists of four themes:

- Queueing Theory
- Performance Analysis of Production Systems
- Performance Analysis of Communication Systems
- **Multivariate Risk Modelling**

Senior fellows for this (MRM) project are:
- Wim Schoutens (KU Leuven),
- Jef Teugels (KU Leuven)
- Bas Werker (until October) (Tilburg University)

This new project lies at the interface of economics, finance and insurance. In the framework of a dynamic financial analysis, there is a strong need to investigate financial and economic issues that are relevant with respect to risk modelling.

3.1.1. Summary of the research by members of the QPA group

Ahmad Al Habali

Arrived December 2008.

Paul Beekhuizen

Networks on Chips (NoC) constitute an emerging paradigm for on-chip communication. NoCs are composed of a number of hardware elements (routers, links, network interfaces) that are connected to form a network, plus a set of rules (a communication protocol) that specify how the packets are routed through the network. To be economically viable, a NoC must be implemented on a very small area of the chip and must satisfy stringent cost constraints. This leads to a number of distinguishing features:
(a) the queueing elements are switches with small buffers, suffering from Head-of-Line blocking;
(b) the predominant routing mechanism is worm hole routing;

(c) flow control is used to limit the number of packets in the network and to avoid overflow at the receiver.
These features give rise to challenging performance analysis questions that will be studied in a joint project of EURANDOM and Philips Research.

Given lectures:
- QPA reading seminar: Stochastic storage processes.

Contributions:
- ValueTools, Athene, October 20-23
- EURANDOM anniversary, 3-minute talk, August 27

Visits:
- 33rd Lunteren conference on the mathematics of operations research, Lunteren
- Queueing Colloquium
- Young European Queueing Theorists workshop, EURANDOM
- Philips-EURANDOM lectures

Other relevant information:
- Teaching: 5CC80, Verification and Performance Analysis of Communication Systems.

Reviews:
- Telecommunication Systems (ed.: Carlo Mannino) European Journal of Operations Research (ed.: Jesus Artelejo)

Networks on chips are an emerging paradigm for the connection of on-chip modules such as processors and memories. Motivated by networks on chips where multiple processors share a single memory, Paul Beekhuizen studied, together with Dee Denteneer (Philips Research) and Jacques Resing (Eindhoven University of Technology), tree networks of polling systems. They established a reduction theorem stating that a network of polling systems can be reduced to a classical single-station polling system. Most importantly, this entails that existing single-station results can be applied to networks of polling systems, in order to obtain important performance measures such as mean delays and queue lengths. Furthermore, Paul Beekhuizen and Jacques Resing derived new results for single-station systems which further facilitates the anlysis of tree networks of polling systems.

Stelios Bekiros

Was only very short time and EURANDOM. His main activity was meant to be in the EIB project.

Marko Boon

Marko Boon's research interests are polling models that can be applied to traffic intersections. So far he has been studying polling models with multiple priority levels in one queue.

Given lectures:
- EURANDOM EPPS seminar; August 5, 2008; A two-queue polling model with two priority levels in the first queue.
- EURANDOM 10 years anniversary; August 27, 2008; 3-minute talk about ongoing research.
- ValueTools Conference in Athens; October 21, 2008; A two-queue polling model with two priority levels in the first queue.

Contributions, visits, conferences, workshops:
- ValueTools Conference in Athens; October 21, 2008; A two-queue polling model with two priority levels in the first queue. http://www.valuetools.org.

Other relevant information:
- Before the end of 2008 Marko Boon will have completed two review requests.

Marko Boon's research plan is to study polling models that can be applied to traffic intersections. First he analyses priorities in polling models to model conflicting traffic flows in intersections. Next he finds approximations for an exhaustive polling model where multiple nonconflicting traffic streams face a

green light simultaneously. Then he hopes to find good approximations to model the time limited behaviour of traffic lights at intersections.

Under the supervision of Onno Boxma and Ivo Adan (both Eindhoven University of Technology) Marko Boon has studied polling models with multiple priority levels within one queue. Several existing service disciplines have been analysed, and one new service discipline has been suggested to improve performance of certain priority polling models.

Together with Rob van der Mei and Erik Winands (both VU University Amsterdam) work has started on a survey on applications of polling systems, which is expected to be published in 2009.

Josine Bruin

Josine Bruin studies the performance of a one-step improvement approach in multi-type production systems, based on a fixed cycle. The first question is how to find a good fixed cycle; another question is how well the one-step improvement approach performs compared to other strategies. René Haijema applied the same approach on a traffic light system and found interesting results.
In order to find a good fixed cycle, optimal decision levels (for stock levels) and lengths of production periods need to be found.

Given lectures:
- Instructions SOR, 06-10-1008-25-01-2009

Contributions, visits, conferences,workshops:
- 15-01-2008 - 17-01-2008: LNMB-conference, Lunteren, http://www.lnmb.nl/conferences/lunteren2008/index.html
- 25-04-2008, Queueing Colloquium, CWI,
- 08-05-2008 - 12-05-2008, POMS conference, La Jolla, US, www.poms.org
- 14-07-2008 - 18-07-2008, Fifth European Congress of Mathematics, Amsterdam (RAI), http://www.5ecm.nl/
- 25-09-2008 - 26-09-2008, Beta Conference, Eindhoven, http://fp.tm.tue.nl/beta/Betaconference2008/index.htm
- 21-11-2008, queueing colloquium, CWI
- 01-12-2008 - 03-12-2008, YEQT, Eurandom

Çağdas Büyükkaramikli

Cagdas is working in the department IE&IS.

In this thesis, Çağdas analyzes production units that employ periodic workforce flexibility operating in different environments and under different lead time requirements. Each lead time requirements and the operating environment define a setting of the PU, and for each setting he develops models to analyze the capacity costs and the level of conformance to the lead-time requirements. The aim of the study is to develop capacity decision policies that minimize the sum of capacity related costs under each setting. Capacity related costs consist of permanent capacity usage costs per period, and the costs of changing the capacity, which is dependent on the frequency and the magnitude of the capacity change.

Contributions, visits, conferences, and workshops:
- Washington D.C., October 12-15 2008, Informs Annual Meeting , http://meetings.informs.org/DC08/

Brian Fralix

Brian Fralix is primarily interested in Palm theory, and how it can be used to describe the transient behavior of various types of queueing systems. Other interests in queueing include processes with randomly-varying arrival and service rates, polling models, and the theory of weak convergence of queues (again related to his interest in transient behavior). He also has interests in Markov chain theory.

Given lectures:

- Brian gave a talk at the INFORMS annual conference in Washington D.C. on Tuesday, 10-10-2008, in the invited session "Queues in Random Environment". This was based on EURANDOM report 2008-25, which was jointly written with Ivo Adan.

Contributions, visits, conferences, workshops:
- Gave a talk at the annual INFORMS meeting in Washington D.C., which was held from 12-10-2008 to 15-10-2008. Website: http://meetings.informs.org/DC08/
- Queueing Colloquium at CWI on 21-11-2008: website: http://homepages.cwi.nl/~sindo/QueueingColloquium/

Brian Fralix is currently interested in the transient behavior of queueing systems. Together with Germán Riaño, he has derived new versions of Little's law that can be used to find nice expressions for the time-dependent moments of an M/G/1 queue that operates in a pre-emptive manner (can be resume or repeat), for any initial condition. He has also used a transient analogue of the ASTA property to derive other formulas that give insight on transient behavior. Other work includes analyzing semi-Markov-modulated queues with Ivo Adan, along with waiting time distributions in polling systems with Onno Boxma and Josine Bruin.

Florence Guillaume

Florence Guillaume is a PhD student in MVR, who does her first 2 years of research in KU Leuven and will come to work at EURANDOM in October 2009.

Jevgenijs Ivanovs

Jevgenijs Ivanovs' research topic is queueing systems with Lévy input. Essentially his work splits in two parts. Firstly, he studies classical queues with complex input, where it is assumed that a queue is fed by a Markov additive process. Secondly, Jevgenijs works on more complex queueing systems with Lévy input. More precisely, he considers a polling system with correlated Lévy input at different queues and various "branching type" disciplines.

Given lectures:
- UvA PhD colloquium 10-10-2008: "Markov additive processes and queues";
- EURANDOM EPPS seminar 11-11-2008: "Markov additive processes with one-sided jumps"

Contributions, visits, conferences, workshops:
- Paris 23-06-2008 – 28-06-2008 "Stochastic Networks" http://www.liafa.jussieu.fr/~gmerlet/StochasticNetworks/;
- Eindhoven 26-08-2008 – 28-08-2008 "10 years of EURANDOM" http://www.eurandom.nl/10years.htm;
- Amsterdam 21-11-2008 CWI queueing seminar;
- Eindhoven 01-12-2008 – 03-12-2008 "YEQT-II" http://www.eurandom.nl/workshops/2008/YEQTII/YEQT_main.htm

Other relevant information:
- Supervised a course in Measure Theoretic Probability (fall 2008)
- Organized (together with Peter Van de Ven) a QPA reading seminar
- Collaborated with Zbigniew Palmowski, Offer Kella and Bernardo D'Auria

The main line of Jevgenijs' research is about Markov additive processes (MAPs) with one-sided jumps. It is of high importance to characterize the record process of a MAP. Based on their previous results (with Onno Boxma and Michel Mandjes) on the singularities of the generator of a MAP, they were able to fully characterize the above mentioned record process. Furthermore, together with Michel Mandjes they showed that in time-reversible case this characterization is of a simple appealing form, making their results easy to apply in practice. In collaboration with Berbardo D'Auria, Offer Kella and Michel Mandjes they successively applied the above theory to the problem of two-sided reflection of Markov modulated Brownian motion.

Henrik Jönsson

The research conducted is in the areas of credit risk modelling and credit derivatives pricing with Lévy processes; pricing, hedging, risk management and rating of Asset Backed Securities (ABSs) and derivatives on ABSs; and alternating risk reserve processes. In credit risk they are pricing exotic options on single name Credit Default Swaps (CDSs) and pricing of non-standard CDSs using a firm value approach where the firm's value process is driven by an exponential Lévy process. In asset backed securities project they study the pricing, hedging and risk management of ABSs using realistic and tractable models for defaults and prepayments. In the risk reserve project they study an alternating risk reserve process with a constant barrier where the risk reserve process can be in two states. The change of state can occur either at the arrival of a claim or at the arrival of an independent Poisson observer.

Given lectures:

- EPPS seminar 16-12-2008: "Jumping to Default – Credit Risk Modelling with Lévy Processes"

Contributions, visits, conferences, workshops:

- Mini-workshop "Credit Risk and Asset Backed Securities", EURANDOM. 24-10-2008. Title of talk: "Advanced Models for Pricing Constant Maturity Swaps".

Other relevant information:

- Supervision of a mini-project for three TU/e students doing a minor in financial and actuarial mathematics at the Department of Mathematics, TU/e.
- Cooperation with G. Bichisao, M. Belluci, and Karsten Sundermann at the European Investment Bank.
- Henrik Jönsson has work with Fang Fang, Delft University of Technology, on the pricing of Credit Default Swaps under Variance Gamma, CGMY and Normal Inverse Gaussian processes using a numerical procedure for pricing barrier options developed by Fang Fang and Kees Oosterlee, Delft University of Technology.

The plan for July 2008 - October 2010 is to work on Asset Backed Securities (ABSs) in cooperation with the European Investment Bank. The research is performed in the "Quantitative analysis and analytical methods to price securitization deals" project sponsored by the European Investment Bank. The focus of the project is on the quantitative modelling, analysis and assessment of important risks in Asset Backed Securities other securitization deals and can be divided into five parts:
1. Establish a theoretical framework for the analysis of ABSs.
2. Develop and investigate new models for the rating of ABSs –take into account crash scenarios, extreme events, lessons from the credit crises.
3. Analyze typical cash flow features and waterfall structure;
4. Investigate model risk on rating, WAL, IRR.
5. Mark-to-model of ABS deals.

From November 2006 until October 2008 the plan was to carry out research in the field of credit risk, in particular develop and apply Lévy models in credit risk modelling and pricing of credit derivatives. A first step was made by the development of a firm value model allowing for only negative jumps corresponding for negative shocks. With this model it is possible to create and implement a spread generator that can be used to price CDSs. As soon as this is done they can calibrate the model on market data. Once fast pricing and calibration algorithms are in place, one can price exotic credit risk products and portfolios by Monte-Carlo methods or other advanced numerical techniques. As such one obtains a series of tools for realistic assessment of the risk of credit derivatives.

The second step was to apply these Lévy models and tools to other more exotic credit risk products, such as constant maturity CDS.

As a continuation of the credit derivatives modelling and pricing they work on applying Variance Gamma, CGMY and Normal Inverse Gaussian process to model the firm value and to price CDSs by using a numerical procedure based on Fourier cosine expansions developed for pricing barrier options. With these models they can apply the same methodology as before to price exotic derivatives and Constant Maturity CDSs. This work will be done during June 2008 to December 2008.

In parallel with the asset backed securities and credit risk research studies in alternating risk reserve processes will be carried out. In particular they will study an alternating two state risk reserve process with a constant barrier. The state of the process is changed either by an independent Poission observer or at claim arrivals. At the first stage the problem is studied for the case when the premium is collected

with constant rates and the claims arrive according to a compound Poission process with different arrival rates and claim size distributions. At the second state the model will be generalised and the risk reserve processes will be of a more general Lévy process.

Together with professor Wim Schoutens (KU Leuven, Belgium), professor Cornelis Oosterlee (TU Delft), and Fang Fang (TU Delft) Dr. Henrik Jönsson has been working on a paper on pricing of single name credit derivatives using Lévy models. The paper is being finalized and will be submitted early 2009.

Henrik Jönsson has also started up collaboration with professor Onno Boxma and Dr. Jacques Resing, Department of Mathematics and Computer Science, TU/e, and Dr. Vsevolod Shneer, EURANDOM. In this project an alternating risk model with a constant barrier is studied and has resulted in two papers that are to be finalized before the end of the year.

Since July Dr. Jonsson has started to work on the "Quantitative analysis and analytical methods to price securitization deals" project sponsored by the European Investment Bank. Together with professor Wim Schoutens and Geert van Damme (KU Leuven) a first paper has been finalised and is accepted for publication in Radon Series on Computational and Applied Mathematics.

Yoav Kerner

- Conditional past and remaining inter-arrival times, service times and soujourn time, given the state of the queue.
- Customers behavior in queueing systems.
- The output processes of queueing systems

Contributions, visits, conferences, workshops:
- ValueTools 2008, Athens, Greece. http://www.valuetools.org/

Visits other institutes:
- Tel-Aviv University. Informal visits, each one for a few days in Israel.
- Worked with Refael Hassin on Price of Anarchy.

Kamil Kosinski

The research is going according to the proposal for the NWO Open Competition. Summarizing, he has been working untill now on a polling model with N queues each driven by a pair of Lévy processes describing the workload during an active and an idle period.
Random walks and queues are active research topics in applied probability and stochastic operations research, with applications in computer-communications, manufacturing and many other fields, while Lévy processes form an important topic in probability theory. Although there is a huge and mature literature on random walks and queues, as well as on Lévy processes, there is only a relatively small collection of studies devoted to their interface. The goal of the project is to systematically investigate problems at the interface of random walks, queues and Lévy processes. They shall study N-dimensional queueing models with as input a Lévy process. This generalizes the classical M/G/1-type queues, in which the input process is a compound Poisson process – which is a special case of a Lévy process. They mainly focus on queues with the additional feature of server vacations, which may depend on the previous busy period. They also consider Lévy processes, reflected at the origin, for which the Laplace exponent changes when a certain workload threshold is exceeded.
The research is in the framework of a PhD project funded by NWO, called "A Study on Queues and Lévy Processes (SQALP)" and done in cooperation between UvA and EURANDOM. Kamil's supervisors are professor Michel Mandjes at UvA and professor Onno Boxma at TU/e. His work is also done in cooperation with Jevgenijs Ivanovs.

Liqiang Liu

- Queueing network
- Performance evaluation of warehousing systems
- Approximations
- Discrete event simulation

Given lectures:
- QPA Seminar, EURANDOM, 01-07-2008
- FALCON Presentations, Embedded Systems Institute / EURANDOM / Vanderlande
- INFORMS, Washington DC, 18-10-2008

Contributions, visits, conferences, workshops:
- CWI
- YEP
- INFORMS
- YEQT-II

Other relevant information:
- FALCON Project with Embedded Systems Institute and Vanderlande.

Liqiang will focus on the study of approximations, using structured approximations, methods like aggregation and decomposition, or based on asymptotic results. This work is not only a rich area in theoretical research, but also contributes to industries directly. So far Liqiang has successfully worked on call centers and distribution centers. He is strongly interested in working more on these applications, as well as other domains such as logistics, manufacturing and communication.
Liqiang is most excited to work on the following two types of approximations:
- Structured Approximations.
  One direction to develop approximations is to coarsen the Markov model. For example, one may aggregate the subnetwork as a single equivalent node, ignoring the fact that the Norton theorem for queueing networks may not hold. Or one may pretend the system operates in a way that does not correspond to the actual situation. As Leonard Kleinrock argued, such assumptions can be well accepted if they describe the general behavior to a fair degree of accuracy, and if, at the same time, the assumptions simplify the mathematics. To identify and test such assumptions is the first step, which is sufficient for applications. To explain the phenomenon, "unrealistic" assumption gives accurate description, is a leap forward.
- Asymptotic Results
  Another direction to develop approximations is to consider limiting cases. This is in some sense a reversal of the steps in structured approximations. One starts with the question what the general behavior would be if the system were to operate under some extreme condition or extreme configuration (e.g. heavy traffic and Halfin-Whitt regime). If the behavior of the limiting system can be described by another model, which is easier to analyze, and moreover, which is insensitive to the details at the "micro" level, then this model can be used to obtain insightful information of the original system, usually in a strikingly simple manner.

Liqiang participates in the Falcon project of Embedded Systems Institute, which is funded by the Dutch government and Vanderlande Industries. The project focuses on design and analysis of next generation automated logistic systems, e.g. distribution centers. He is responsible to develop queuing models and evaluate system performance.
Ivo Adan, Onno Boxma and Jacques Resing are also actively involved in this project. They developed a closed queueing network model. Several approximations are proposed and investigated. On July 1, a computer programme based on the results by then was demonstrated to the industrial partners. Further research motivated by this queueing network model is undergoing. They have found a satisfactory computation scheme.

Andreas Löpker

Andreas Löpker is interested in Markov Processes, in particular in Piecewise Deterministic Markov Processes. He studies the stability of these processes, characteristics like hitting times and distributional properties, and questions that have relevance to applied models, such as queues.

- Given lectures:
  Wroclav, Poland, October 10th, "Hitting times and extreme value theory for Markovian Growth Collapse Models"

Contributions, visits, conferences, and workshops:
- Second Wroclaw Workshop on Stochastic Geometry

- Stochastic Models organized at the Mathematical Institute, University of Wroclaw, October 9-10, 2008

Visits other institutes:
- Wroclav, October. Worked with Zbigniev Palmowski on Duality and Reversibility of PDMPs.

Other relevant information:
Since summer 2009 Andreas is working for the math department of the TU/e in the SOR (Stochastic Operational Research) group.

It is planned to work further on questions regarding the modelling of the TCP window size process by PDMPs and related processes (with Johan van Leeuwaarden, David Goldberg). Other projects are to finish the work on duality and reversion of growth collapse processes (with Zbigniew Palmowski) and to start working on a storage model (with Wolfgang Stadje). I also project to work with David Perry and Gideon Weiss during their visit to EURANDOM in 2009.

In 2008 Andreas continued the study of the window size process for TCP, working on extended results for stability, moments and hitting times for a generalized version of this particular Markov process (with Johan van Leeuwaarden). Andreas worked with Wolfgang Stadje on Markovian grwoth collapse processes, studying hitting times and the running maximum of a Markovian growth collapse process (see EURANDOM report 2009-011). With Offer Kella he investigated a related process under Markovian modulation. The idle period in a classical G/M/1 queue with finite workload was the subject of research in a collaboration with David Perry. In a joint work with Shaul Bar-Lev, Onno Boxma, Wolfgang Stadje and Frank van der Duyn Schouten Andreas contributed to the study of Group Testing Procedures.

Vika Masol

Until April 30, 2008

One of the research directions is to extend the Lévy base correlation model for pricing options on CDO tranches. Another direction is to study the real inversion formulas for Laplace transform. The potential of the formulas for numerical invertion of a probability measure is investigated. In particular, Vika Masol studied the performance of the formulas adapted for the case where the measure is concentrated on an arbitrary half-line.

Given lectures:
- EURANDOM, April 18, 2008, "Reinsurance" – lecture for TU/e students.

Contributions, visits, conferences, and workshops:
- 7th Winter School on Mathematical Finance, Lunteren, January 21 - 23, 2008.
- Actuarial and Financial Mathematics Conference, Brussels, February 6 - 7, 2008. http://www.afmathconf.ugent.be/index.php?page=formereditions
- 1st International Financial Research Forum, Paris, March 27 - 28, 2008. Presentation: "Pricing and hadging CDOs with Levy base correlation". http://www.finance-innovation.org/risk08
- Risk Europe Conference, Stockholm, April 22-24, 2008. Presentation: 'Lévy Base Correlation". http://www.risk-europe.com/

Visits other institutes:
- K.U.Leuven, Working with Wim Schoutens and Florance Guillaume on Pricing Options on CDO tranches.

Other relevant information:
- Together with Henrik Jönsson, organizing seminars "Lévy processes in finance and queuing" at EURANDOM
- Participation in the Contact afternoon EURANDOM - TU Delft + CWI, April 15, EURANDOM. Presentation on Lévy Base Correlation.

Together with professor Wim Schoutens (KU Leuven, Belgium) Dr. Viktoriya Masol has been working on the extention of the Lévy base correlation model for pricing options on CDO tranches. Furthermore, she has been working with professor Jef Teugels on investigating Laplace transform inversion formulas, in particular those adapted to recover probability measures concentrated on an arbitrary half-line.

Gergely Mincsovics

Balakrishna Prabhu

Balakrishna Prabhu's significant activities in the first two months were as follows :
Teaching :

- Along with Sem Borst, Bala gave a course on "Queueing Theory" for Master students of the Electrical Engineering Department of the TU/e.

Lectures :

- Balakrishna gave a lecture at EURANDOM titled "Two problems in communication networks" describing his on-going research.

Collaborations :

- During his stay Bala worked with Onno Boxma on the analysis of a queue with impatience and arrival process modulated by the workload. Such a queue has a counterpart in communication networks where the arrival rate of TCP is modulated by the workload at a router.
- In addition to this work, he also collaborated with Sindo Nuñez-Queija (CWI and UvA) on the analysis of broadcast times in peer-to-peer networks with random contacts.

Ingrid Reijnen-Koens

Ingrid Reijnen's research is concerned with planning and design of spare parts networks. She considers the inventory control problem for spare parts networks where lateral transshipments are allowed. Furthermore they are interested in the design of a network where lateral transshipments take place.

Visits other institutes:

- Ingrid visited Lund University (Sweden) from 15 November 2008 until 15 February 2009. She worked together with Christian Howard and Johan Marklund. They worked on a spare parts network problem where they were interested in the importance of pipeline stock when emergency shipments are allowed in the network.

Together with professor Geert-Jan van Houtum and Dr. Tarkan Tan Ir. Ingrid Reijnen worked on a paper "Inventory planning for spare parts networks with delivery time constraints" that is motivated by a master thesis project of Myrthe Koppes, performed at IBM.
From July till half November Ir. Ingrid Reijnen has been on pregnancy leave.
Half November Ir. Ingrid Reijnen went to Lund University (Sweden) for three months to work together with Christian Howard and Johan Marklund in the group of professor Sven Axsäter. During the visit they worked together on a project motivated by the spare parts networks of a Dutch and a Swedish truck company (DAF and Volvo).

Teaching:

- 1CM45 Business economics and management accounting for BIS (instructor)
- 1CP06 Business Economics (instructor)

Vsevolod Shneer

Vsevolod Shneer's research topics:

- Stability and rare events in communication networks
- Heavy tails in random walks and Lévy processes
- Heavy-traffic regime in queueing theory
- Survival probabilities in risk models

Given lectures:

- Stability of a multiple-access spatial stochastic algorithm, Technical University of Munich, 05-06-2008.
- Instability of the Max Weight scheduler in a dynamical setting. Wroclaw, 10-10-2008.

Contributions, visits, conferences, workshops:

- 33rd Conference on the Mathematics of Operations Research, Lunteren, 15 - 17 January 2008

- Spatial Stochastic Models for Wireless Networks, Berlin, 04-04-2008
- Stochastic Geometry, Stochastic Models, Wroclaw, 9 -10 October 2008

Visits other institutes:
- Heriot-Watt University, Edinburgh, 12 - 20 May 2008
- Technical University of Munich, 2 - 6 June 2008
- University of Toulouse, 29 September - 3 October 2008

Other relevant information:
- Teaching of two undegraduate courses
- Organiser of the YEQTII workshop

Together with Sem Borst and Peter van den Ven, Dr. Shneer has been working on stability and instability of different scheduling policies in a dynamical population of flows. Peter van de Ven and Vsevolod. Shneer also worked on throughput in the multi-hope line network. Together with Vitali Wachtel (Munich) he worked on heavy-traffic scalings of various characteristics of a single-server queue. Vsevolod Shneer also worked with Mathieu Jonckheere on stability of a system of N queues with general state-dependent service-rate allocations. Together with Onno Boxma, Henrik Jönsson and Jaques Resing, dr. Shneer obtained several results on survival probabilities for specific risk reserve processes.

Peter van de Ven

Peter van de Ven worked on two subjects in 2008. Together with Sem Borst and Vsevolod Shneer he looked into the stability of queue-based scheduling with dynamic users, specifically in the context of wireless networks. The second resource allocation problem he considered is the behaviour of CSMA/CA networks in tandem, and in particular achieving fairness in these types of networks. This is joint work with Sem Borst, Dee Denteneer, Johan van Leeuwaarden and Vsevolod Shneer.

Ingrid Vliegen

Ingrid Vliegen's research mostly focuses on the capital good industry, more specifically on inventory models for spare parts. Methodologies that she uses in this research: queueing theory, stochastic processes, simulation and empirical studies.

Given lectures:
- QPA seminar, 22-01-2008, Bounds on the order fill rates for an inventory system of service tools
- INRIA Grenoble, 08-04-2008, Bounds on the order fill rates for an inventory system of service tools
- Université de Versailles, 11-04-2008, Bounds on the order fill rates for an inventory system of service tools
- EPPS, 19-08-2008, Optimization of stock levels for service tool inventory
- Rijksuniversiteit Groningen, 28-10-2008, Optimization of stock levels for service tool inventory

Contributions, visits, conferences, workshops:
- Lunteren conference, Lunteren, January 15 - 17 2008, Bounds on the order fill rates for an inventory system of service tools, http://www.lnmb.nl/conferences/lunteren2008/index.html
- MSOM, Maryland, June 5 - 6 2008, Optimization of stock levels for service tool inventory, http://www.rhsmith.umd.edu/doit/msom2008/
- ELA Workshop, Grainau, June 25 - 28 2008, Optimization of stock levels for service tool inventory, http://www.elalog.org/
- OR50, York, September 9 - 11 2008, Optimization of stock levels for service tool inventory, http://www.theorsociety.com/orshop/(xp0ejk554r2lzsa0xce45445)/orcontent.aspx?inc=or50_main.htm
- Beta conference, September 25 – 26 2008, Optimization of stock levels for service tool inventory, http://fp.tm.tue.nl/beta/Betaconference2008/index.htm
- Informs, October 12 – 15 2008,Analysis of a Backfilling Scheduling Policy, http://meetings.informs.org/DC08/

Visits other institutes:
- Inria Grenoble and Université de Versailles, April 7 – 11 2008, worked with Ana Busic
- CMU Pittsburgh, May 26 - June 3 2008, worked with Alan Scheller-Wolf and Paul Enders

Other relevant information:
Teaching:
- assistant at premaster course Business Economics
- assistant at bachelor course Economics Management
- supervision of 2 master students
- 1CM45 Business economics and management accounting for BIS (instructor)
- 1CP06 Business Economics (instructor)

Ingrid Vliegen studies algorithms to determine near-optimal stock levels for service tools. With Alan Scheller-Wolf (CMU, Pittsburgh) and Ana Busic (Université Paris Diderot), a new method for comparing Markov Chains, an extension to the precendence relations method was developed. Together with Geert-Jan van Houtum, Alan Scheller-Wolf and Ana Busic, she worked on an optimization algorithm to determine near-optimal stock levels for a single location. With Ad Kleingeld and Geert-Jan van Houtum she performed an empirical study to find the advantages and disadvantages of the use of tool kits in the field. With Ronnie Buermans and Geert-Jan van Houtum, she worked on a multi-location model, in which both spare parts and tools are included.

Sandra van Wijk

Sandra van Wijk considers a system with two or more parallel queues, where it is possible that an arriving job at one queue is sent to another queue. They want to minimize the total costs of the waiting times and job transfers. This problem is connected to an inventory problem with a so-called lateral transshipment, where a demand at a stockpoint that is out of stock can be fulfilled via lateral transshipment from another stockpoint. The queueing problem can be translated into this inventory problem and vice versa.

Next to this research, Sandra works on polling systems. They investigate what kind of (mixes of) service strategies lead to more fairness, e.g. to more equal mean waiting times at the queues.

Contributions, visits, conferences, workshops:
- Visit to 5th European Congress of Mathematics, July 14 - 18, 2008, Amsterdam;
- Visit to third Beta Conference, September 25 - 26, 2008, TU/e;
- Presentation at the Third International Conference on Performance Evaluation Methodologies and Tools (ValueTools), October 20 - 24 2008, Athens, Greece.

3.1.2. Research activities

Workshops and conferences

October 22 - 24, 2008
Handling and modelling of assett backed securities

December 1 - 3, 2008
YEQT II - (Young European Queueing Theorists) Stochastic Analysis of Modern Communication Networks

Lectures and Seminars

In 2008 QPA organized 29 lectures and seminars (QPA-MVR regular seminar, QPA Reading Seminar and QPA Max Plus seminar).

EURANDOM visitors

In 2008 QPA hosted 20 visitors; altogether for 16 weeks.

General remarks

In February 2008 Yoav Kerner and Liqiang Liu started in a programme supported by the Board of TU/e and respectively in the Falcon project. In May 2007 Balakrishna Prabhu joined EURANDOM in a joint project with CWI and Eindhoven University of Technology; he left for a CNRS position in April 2008.

One of the four PhD-students of the Department of Technology Management (now Industrial Engineering and Innovation Sciences), of the Eindhoven University of Technology who joined EURANDOM in May 2007, Gergely Mincsovics, did his PhD in November 2008. In October 2008 Kamil Kosinski started to work at EURANDOM in a joint (NWO) project with the University of Amsterdam. Ahmad Al Hanbali joined QPA in December 2008; he is PD on the 3rd postdoc-year granted by NWO on QNOISE (CWI, UT en TU/e). He also was appointed in Twente, in the proceeding year.
Vika Masol was already working at EURANDOM on a FWO grant (of Wim Schoutens in Leuven); January 28 she continued her research as "EURANDOM PD" until May 1.

3.1.3. External contacts / cooperation

The QPA programme keeps close ties with the Stochastic Operations Research group (SOR) at the Eindhoven University of Technology, Department of Mathematics and Computer Science and with the Operations, Planning, Accounting and Control group (OPAC) at the Eindhoven University of Technology, Department of Technology Management with whom we have a joint PhD appointment and there are growing interactions with the Department of Mechanical Engineering. We started a problem session to informally discuss open problems and to stimulate interaction and cooperation between researchers. There are joint activities with several members of these groups (Technology Management and Mechanical Engineering) as well with as the Embedded Systems Institute (in the FALCON project). There are also several interactions with researchers from the groups at CWI, both UvA en VU, Amsterdam (amongst others a joint PhD project) and Twente University, and the VU University, Amsterdam.

Nationally, there are close ties with Philips, who funded a PhD position. Participation in BRICKS (Basic Research in Informatics for Creating the Knowledge Society) involved close cooperation with CWI and the University of Twente, and the funding of a postdoctoral fellowship. Some short consultancy / Master projects took place with a.o. Metro, Heineken.

Internationally, the QPA programme maintains strong ties with KU Leuven, especially in the MVR project and with Heriott Watt University, where several postdocs came from and / or went to, after their postdoc period at EURANDOM. Onno Boxma was appointed visiting fellow at HWU.

QPA is also involved in an EC Network of Excellence (Euro-FGI, later Euro-NGI and now Euro-NG), which gave rise to several visits to and from EURANDOM researchers, and participates in the EC research project IST (Information Society Technologies) NET-REFOUND (NETwork REsearch FOUNDations). The objective of the NET-REFOUND is to develop the theory, methods and algorithms suitable for the modelling, analysis and design of future telecommunication networks. The long-term goal is the theoretical understanding of the collective interaction of a multiplicity of communicating nodes beyond the boundaries posed by specific telecommunication standards. This will lead to a quantitative characterization of the fundamental performance limits of these systems and eventually to algorithms for achieving them. Envisioned paradigms can change the way we manage, operate and understand networks and foretell a deep impact in areas such as reliable information delivery, network resource sharing, efficient flow control, network monitoring and security. In order to understand and fully exploit the immense networking possibilities, novel research is needed that will lay foundations well beyond the currently existing communication network theory. The strategic objective of this project is to provide guidelines and visions for developing a Network Science that will result in a better understanding of how future complex networks will function. More importantly, it would provide clear and precise guidelines on how to better design and control networks. It will also build and optimize the components that will become the cornerstones of wireless networking technology in the next decades by developing the theoretical foundations of networking and designing the ways to achieve them. The ultimate objective of this proposal is to provide the necessary axioms, underlying theory and practical tools to achieve several orders of magnitude increase in network capacity.

Via Jef Teugels, QPA is also involved in MATHFSS. The MATHFSS (Mathematics for Science and Society) project is a Support Action of the New and Emerging Science and Technology (NEST) programme of the European Commission (6th EC Framework Programme). The NEST programme aims at integrating and strengthening the European Research Area. The MATHFSS-project started in December 2005 and lasted for 2 years + some extension. It aimed to stimulate interaction between advanced research workers and to explore ways of training doctoral-level researchers in key areas where mathematics will have a newly prominent role in science and society. The MATHFSS project is a collaborative action of the Centre de Recerca Matemàtica (CRM) in Spain, the Emmy Noether Research Institute for Mathematics (ENI) in Israel, the Institut des Hautes Études Scientifiques (IHÉS) in France and EURANDOM,

promoted by the European Research Centres on Mathematics (ERCOM) committee of the European Mathematical Society.

Henrik Jönsson holds a Marie Curie Fellowship in QPA, project MVR, until November 1, 2008.

3.2. Random Spatial Structures (RSS)

3.2.1. Summary of the research by members of the RSS group
3.2.2. Research activities
3.2.3. External contacts / cooperation

3.2. Random Spatial Structures (RSS)

For details concerning the scientific results obtained, we refer to the publications of the researchers and to the EURANDOM report series. *See Chapter 5, Section 5.1., and 5.2.*

Senior fellows for this programme are
- Remco van der Hofstad (Eindhoven University of Technology)
- Frank den Hollander (Leiden University).

The RSS-programme moves at the interface between probability theory and statistical physics. It focusses on the study of systems consisting of a large number of interacting random components. These components interact with each other and with their environment. Even when the interaction is local, such systems typically exhibit a complex global behaviour, with a long-range dependence resulting in anomalous fluctuations and phase transitions.

To mathematically understand these systems requires the use of powerful probabilistic ideas and techniques. The challenge is to introduce simple models, which serve as paradigms, and to unravel the complex "random spatial structures" arising in these models. Statistical physics provides the conceptual ideas, while probability theory provides the mathematical language and framework. The important challenge is to give a precise mathematical treatment of the physics that arises from the underlying complexity.

Mathematical statistical physics is currently going through a phase of rapid and exciting development. Some of the key items associated with interacting random systems are finally being understood at the mathematical level, such as critical exponents, surface fluctuations, non-Gibbsianess, and spin glass behaviour. Interacting random systems are recognised world-wide as being of primary scientific importance. Mathematical statistical mechanics is widely known to foster interdisciplinary approaches and to provide expertise and training in analysing and modelling complex random processes.

The RSS-programme focuses on three themes:
- Critical phenomena
- Disordered media
- Combinatorial probability

In addition, the programme aims to extend towards applications in biology. Interacting random systems occur in a multitude of theoretical and applied settings. Examples are Ising spins: magnetism, lattice gas dynamics: metastability, percolation: porous media, interacting diffusions: population dynamics, random graphs: communication networks, self-avoiding walk: polymers and sandpiles: self-organized criticality

Key techniques are:
Gibbs theory, renormalization, conformal invariance, entropy production, hydrodynamic scaling Multi-scale analysis, large deviations, spectral theory, combinatorial inequalities, lace expansion, random graph theory.

Former postdocs
- Cristian Giardinà
- Francesca Nardi
- Wouter Kager

are associated to the RSS programme as research fellows

3.2.1. Summary of the research by members of the RSS-group

Sébastien Blachère

Main themes of research:
- Random walks on countable groups (asymptotic properties of the Green metric, branching random walks on groups)
- Random walks in random scenery (existance of bad configurations in a one dimensional model with drift)
- Random growth model (Limiting shape for the Internal Diffusion, Limited Aggregation in several settings)
- Once-Reinforced Random Walks

Other relevant information:
- Review for Electronic Communication in Probability
- With Frank den Hollander and Jeffrey Steif: "A crossover in bad configurations for Random Walk in Random Scenery" (study of the occurence of configurations where the law of the color at the origin can be influenced by changing colors even after a large time). Work in progress.

Dmitris Cheliotis

Dimitris Cheliotis is interested in statistical mechanics, motion in random medium, and random matrix theory.

Given lectures:
- TU/Berlin, 18-03-2008. The noise of perturbed random walk on some regular graphs
- CWI, 01-04-2008. The noise of perturbed random walk on some regular graphs

Contributions, visits, conferences, workshops:
- BRG Meeting, Berlin, March 17 – 20 2008

Other relevant information:
- Balint Virag (assistant professor from the University of Toronto) visited Eurandom from April 25 to May 2. They finished one paper, and discussed one more.
- Together with Balint Virag, Dimitris Cheliotis studied the spectrum of the transition matrix of simple random walk on a large regular graph that looks locally like tree, and how the spectrum behaves under small random perturbations on the transition probabilities of the walk.
- In the study of Sinai's random walk, he overcame the most significant obstacles towards proving a large deviations principle for the number of metastable states visited during a given large period of time.
- Also, with Balint Virag, Dimitris worked on improving the proof of a theorem they have that gives a functional law of the iterated logarithm for Sinai's walk.
- Finally, Dimitris worked with Frank den Hollander on the pinning problem for directed polymers. They were able to answer some open questions, and give quick proofs of known results using a new technique. Currently, they explore further questions where this technique may help.

Anne Fey-den Boer

On 18-03-2008 Anne Fey successfully defended her thesis “Sandpile models: The infinite volume model, Zhang’s model and limiting spaces” at the VU University in Amsterdam. During the following months (May and June, she had a temporary appointment in order to continue work on some of the results.

Robert Fitzner

Robert Fitzner started late 2008.

Markus Heydenreich

Markus Heydenreich did his PhD thesis in November 2008.

Visits, workshops:
- University of Bath & UK) February 25 – 28, 2008
- September 2008, two weeks workshop Institut Henri Poincaré in Paris.

Wouter Kager

Wouter Kager left early 2008.

Tobias Müller

Nicolas Pétrélis

After finishing the position on the NWO grant on October 31, 2007, Nicolas got a three month extension of contract. Together with Frank den Hollander he finished two publications and he assisted Den Hollander with finalizing his monography "Random Polymers".

Artem Sapozhnikov

Artem Sapozhnikov started late 2008.

Cristian Spitoni

Cristian Spitoni's research interests are mostly focused on rigorous Statistical Mechanics. In particular:
- Many particle systems (deterministic infinitely many interacting particle systems)
- Metastability (Glauber and parallal dynamics for interacting particle systems)
- Equilibrium statistical mechanics (phase transition for interacting spin systems)

Given lectures:
- 14-04-2008, Leiden (reading group on statistical mechanics)
- "Dobrushin uniquess theorem"
- 26-05-2008, Groningen (reading group on statistical mechanics) "Phase transitions and Peierls argument; FKG inequalities"

Contributions, visits, conferences, workshops:
- Workshop on Metastability, EURANDOM, 10-01-2008 "Homogeneous nucleation for Glauber dynamics"
- Conference "Random Systems from Physics to Biology", "Homogeneous nucleation for Glauber and Kawasaki dynamics" 19-03-2008 Berlin
- Grefi Mefi Workshop on Equilibrium statistical mechanics, (25 - 29 February 2008, Marseille France

Lihu Xu

Lihu Xu started late 2008.

Stochastic PDE

Visits other institutes:
- Florence University, Italy

Lihu Xu has begun to work with professor den Hollander on the project renormalization programming in branching processes.

3.2.2. Research activities

Workshops and conferences

In 2008 RSS organized 4 workshops:

January 9 - 12, 2008
Metastability

March 10 - 14, 2008
YEP V: Statistical Mechanics on Random Structures

May 19 - 23, 2008
Hitting, returning and matching in dynamical systems,
information theory & mathematical biology

July 16 - 28, 2008
Workshop on Statistical Mechanics and Applications

See Chapter 6, Section 6.1, for more detailed information.

Lectures and seminars

In 2008 RSS organized 26 lectures and seminars (RSS regular and RSS Reading seminars)

See Chapter 6, Section 6.2 for more detailed information.

EURANDOM visitors

In 2008 RSS hosted 20 visitors; altogether for 43 weeks.

General remarks

Nicolas Pétrélis January 2008, went to Berlin, Wouter Kager Februari 2008, went to VU, Anne Fey June 2008 went to TU Delft, Sébastièn Blachère August 2008, went to SKF-Nederland, Markus Heydenreich September 2008 went to VU Amsterdam, Tobias Müller October 2008 went for a one-year position to Tel Aviv University, Israel, Cristian Spitoni October 2008; went to LUMC.

New people: Robert Fitzner (PhD student at the Department of Mathematics and Computer Science, TU/e), late September 2008, Lihu Xu 01-10-2008, Artem Sapozhnikov 01-11-2008

3.2.3. External contacts / cooperation

There is a close interaction and collaboration with the probability and statistics group at the Eindhoven University of Technology Department of Mathematics and Computer Science. Most of the group members are active at EURANDOM. In addition, there is close contact with the group in stochastic operations research at EURANDOM and the department.

The RSS-group continued to have contacts with the Mathematical Institute of Leiden University. Also, intensive contacts with scientists in Germany, amongst others in the framework of the Dutch-German Bilateral Research Group (BRG) on "Mathematics of Random Spatial Models from Physics and Biology" were continued. The activities of the group are funded by DFG and NWO. The group meets twice a year for a two-day workshop, during which progress on joint projects is reported. Also contacts with RUG (Arnout van Enter, Christof Külske) are maintained.
In 2008 again a YEP (Young European Probabilists) workshop was organized, on "Statistical Mechanics on Random Structures".

David Brydges, Department of Mathematics at the University of British Columbia, Vancouver, Canada, was EURANDOM Chair in 2008 from mid May until mid July. He gave a Public Lecture entitled "Would you rather be a field or a particle?" as well as a series of lectures on (1) Models and their representation in terms of Gaussian integrals, (2) Hierarchical models and the action of the renormalisation group, (3) Renormalisation group for models on the Euclidean lattice.

3.3. Statistical Information and Modelling (SIM)

3.3. Statistical Information and Modelling (SIM)

Senior fellows for this programme are:
- Laurie Davies (Universität Duisburg-Essen, Germany and TU/e),
- Alessandro Di Bucchianico (Eindhoven University of Technology) until September 2008,
- Richard Gill (Leiden University),
- Mathisca de Gunst (VU University, Amsterdam),
- Chris Klaassen (University of Amsterdam), and
- Marie-Colette van Lieshout (CWI, Amsterdam).

January 1, 2008 a new senior fellow started in the SIM group:
- Prof.dr.ir. G. (Geurt) Jongbloed from Delft University of Technology

His research interests are: inverse problems, shape restricted statistical inference, incomplete data problems, nonparametric estimation, computational statistics, asymptotic statistics, applications of statistics in biology, medicine, computer science, business, river studies, and earth sciences.

Former postdoc
- Peter Grünwald

was associated to the SIM programme as research fellow.

Mathematical statistics is an indispensable tool in all fields of modern science. At EURANDOM we focus on themes from areas presently undergoing vigorous development, and supplying major challenges to statistics and data-analysis: biology and image analysis. Each area presents its own unique types of problem, but the same fundamental ideas from theoretical statistics can be applied in both, giving insight and creating underlying links. The availability of huge amounts of data, having a complex stochastic structure depending on very many unknown parameters, calls for statistical modelling and analysis techniques having a different flavour from classical methodology. Despite modern computational power, the problems require a closer than ever intertwining of algorithms and theory: scientific ambition and the size and complexity of data grow faster than our ability to mechanically process those same data.

Signal and Image Analysis

3.3.1. Summary of the research by members of the SIM group

Ambedkar Dukkipati

Left EURANDOM end March 2008 for Indian Institute of Science in Bangalore (after having spent some time in the UK).

Shota Gugushvili

Shota Gugushvili's research interests fall into two broad categories. The first category deals with parameter estimation for systems of ordinary differential equations. In this context Shota is also interested in applications in mathematical biology. The second category deals with nonparametric curve estimation problems. In particular, he is interested in deconvolution problems and also applications of nonparametric techniques in the mathematical finance.

Given lectures:
- Nonparametric estimation of the characteristic triplet of a discretely observed Lévy process, a talk given at the International Workshop on Flexible Modelling: Smoothing and Robustness - FMSR 2008, November 12 - 14, 2008, Leuven, Belgium.
- Supremum distance for kernel deconvolution, a poster at EURANDOM 1998 - 2008, A Random Tour through a Decade of Research, August 26 - 28, 2008, EURANDOM, Eindhoven, The Netherlands.

Contributions, visits, conferences workshops:
- Stochastics Meeting Lunteren 2008, 17 - 19 November 2008, Lunteren, The Netherlands. http://old-www.cwi.nl/events/2008/lunteren/lunteren2008.html
- International Workshop on Flexible Modelling: Smoothing and Robustness - FMSR 2008, November 12 - 14, 2008, Leuven, Belgium. http://wis.kuleuven.be/stat/fmsr2008.php
- EURANDOM 1998 - 2008, A Random Tour through a Decade of Research, August 26 - 28, 2008, EURANDOM, Eindhoven, The Netherlands. http://www.eurandom.tue.nl/10years.htm

Visits other institutes:
- Korteweg-de Vries Instituut voor Wiskunde, Universiteit van Amsterdam. Collaboration with Bert van Es and Peter Spreij

Other relevant information:
- Referee for Annals of Statistics
- Co-organizer of the Informal Meeting of Eindhoven Statisticians
- Co-organizer of the Workshop on Parameter Estimation for Dynamical Systems to be held at EURANDOM on June 8 - 10 2008
- Co-organizer of the Workshop on Statistical Inference for Lévy Processes with Applications to Finance to be held at EURANDOM on July 15 - 17 2008
- Contributions to the STW grant proposal

Together with Bert van Es and Peter Spreij (UvA) Dr. Shota Gugushvili studied an extension of the classical deconvolution problem to the case when the target distribution possesses an atom. Together with Bert van Es he established the asymptotic distribution of the supremum distance for supersmooth kernel deconvolution and also proved the asymptotic normality of the deconvolution kernel density estimator under the vanishing error variance. Furthermore, he investigated the nonparametric estimation procedures for estimation of the characteristic triplet of a discretely observed Lévy process.

Efang Kong

Semi-parametric and nonparametric modeling and inference Robust regression; empirical likelihood

Visits other institutes:
- Universiteit von Amsterdam Prof Chris Klaassen Statistical modelling of neuron network

With Y. Xia and H. Tong, Efang Kong has finished the project of modelling the nonlinear cumulative effect of covariates on response variables. The application is focused on exploring the influence of various environmental factors on number of admissions to hospital who suffered from respiratory disease.

Efang has also completed the study on quantile regression with a single index approach. They proposed an algorithm which compared to existing method produces empirically more efficient estimates of the parameters. This result is further demonstrated through the analysis of the Bosteon Housing data.

Mikhail Langovoy

On October, 1, 2008 Mikhail Langovoy started to work on the topic of statistical and probabilistic image analysis within the SIM programme in the group of Professor Laurie Davies.

He proposed a novel method for detection of signals and reconstruction of images in the presence of random noise. The method uses delicate results from percolation and random graph theories. They are able to detect and estimate not only regular signals in the images, but also weak signals, as well as fine structures such as curves.
Together with Laurie Davies and Olaf Wittich, Mikhail proposed a randomized algorithm that detects objects in noisy images very quickly: it seems that our algorithm works substantially quicker than, say, wavelets-based algorithms.

Currently they are exploring theoretical properties of our algorithm by proving consistency of their estimates under different model assumptions, as well as by analyzing algorithmic complexity of the procedure in different situations. "

Guangming Pan

Guangming left in May for the National University of Singapore.

3.3.2. Research activities

Workshops and conferences

In 2008 SIM organized 2 workshops:

October 6 - 8, 2008
YES II: High dimensional statistics

November 24 - 26, 2008
Locally adaptive filters in signal and image processing

Lectures and seminars

In 2008 25 lectures and seminars (this includes the Informal meetings of Eindhoven Statisticians) were (co-)organized by SIM.

See Chapter 6, Section 6.2 for more detailed information

EURANDOM visitors

In 2008 SIM hosted 1 visitor, altogether 1 week.

See Chapter 6, Section 6.3 for more detailed information.

General Remarks

Two new postdocs started in 2008 to work for the SIM programme: Shota Gugushvili and Mikhail Langovoy.
Ambedkar Dukkipati (April 2008) and Guangming Pan (August 2008) left.

3.3.3. External contacts / cooperation

The Network of Excellence called PASCAL - Pattern Analysis, Statistical Modelling and Computational Learning was terminated end 2007. MATHFSS officially too, but it was shortly extended.

The SIM project has close links with the Department of Mathematics and Computer Science, TU/e, and through the other senior fellows with UL, UvA, TUDelft
The *i*-BAT project has industrial links with Philips. The researchers of the SIM programme also have several contacts with groups in life science in The Netherlands.

3.4. Integrated Batteries (*i*-BAT)

The *i*-BAT project is done in collaboration with Philips Research Laboratories, Eindhoven University of Technology (Department of Chemical Engineering and Chemistry) and EURANDOM. Projectleader is Prof.dr. Peter Notten (Eindhoven University of Technology and Philips Research Laboratories).

3.4.1. Summary of the research by members of the *i*-BAT project

Dmitry Danilov

Research interests are related to modelling of complex (electro-)chemical systems. Specifically, major line of research is connected with modeling of planar and 3D solid-state batteries, including simulation of electrolytes, complete systems and adaptive algorithms for SoC (State of Charge) indication. Investigation of various aspects of hydrogen storage is also of interest.

Given lectures:

- Simulation of Li-ion batteries: improvements in properties of electrolytes from modelling point of view, by D.Danilov, 4th I-Bat Meeting, "Raman", the Strip, 22 January 2008.

Contributions, visits, conferences, workshops:
- Mathematical modelling of Advanced Electrolytes in Li-ion batteries, by D.Danilov and P.H.L. Notten, 14th International Meeting on Lithium Batteries, Tianjin, China, 26 June 2008.

Other relevant information:
- Teaching course "Hydrogen Storage in Metal Hydrides as part of Hydrogen Tecnologies SET course (6se15), lectures/practices.

Research activity of Dmitry Danilov is performed in close cooperation with the members of electrochemical group of professor P.H.L. Notten and concentrates along two main directions.
First one is a simulation of All-Solid-State planar and 3D integrated Li-ion batteries. In particular, large progress had been made in modelling of solid-state-electrolytes, which constitute an important part of integrated batteries.
Second direction is simulation of gas-phase and electrochemical hydrogen storage in classical and advanced hydrid-forming alloys. Recently published kinetic models combine ability to estimate rates of basic hydrogen storage reactions with very precise description of the pressure-composition isotherms.

Alexander Lyedovskykh

During the last months of 2008 Alexander worked in the *i*-Bat project.
From 2009 he worked in the project NEOT05004 NiMH battery modeling for automotive BMS
Alexander's research interests are related to the first-principle mathematical description and simulation of hydride-forming materials as for hydrogen storage from the gas phase (as a prospective fuel for the modern fuel-cells) as electrochemical hydrogen storage which is used in modern Nickel-MetalHydride (NiMH) batteries (which are widely applied in Hybrid Electrical Vehicles (HEV)). Complete description of the NiMH batteries and Battery Management Systems are also in the field of his interests.

November 13 2008, the research proposal "NiMH battery modeling for automotive BMS" was granted by Senter Novem from 01.05.2009 till 01.05.2010. The project number NEOT05004.

During the first phase of his research project, the experimental data on both Ni and MH electrodes (implemented in real commercially used battery) measured electrochemically and via the gas-phase are used to identify parameters of parameters of equilibrium and non-equilibrium parts of their general kinetic model.
During the second phase using the experimentally measured characteristics of the complete NiMH battery during its operation, make the final identification of parameters and connect all separate parts of the model to one unit. Testing the model on different regimes of battery operation will be performed.

In the same time investigation, mathematical description and simulation of some interesting aspects and phenomenon of hydrogen storage systems will be provided (electrical double layer effect, absorption hysteresis, etc.)

External contacts / cooperation
Through the senior fellow there is a close cooperation with Philips Research Laboratories.

4. PUBLICATIONS

4.1. Papers in journals and proceedings per programme
4.2. EURANDOM report series per programme

4.1. Papers in journals and proceedings per programme

The papers listed below are from postdocs and PhD's

Queueing and Performance Analysis (QPA)

Ahmad Al Hanbali

- Al Hanbali, A., Nain, P., Altman, E. (2008). Performance of ad hoc networks with two-hop relay routing and limited packet lifetime (Extended version). Performance Evaluation, 65(6-7), 463-483.
- Al Hanbali, A., Haan, R. de, Boucherie, R.J., Ommeren, J.C.W. van (2008). A tandem queueing model for delay analysis in disconnected ad hoc networks. In K. Al-Begain, A. Heindl, M. Telek (Eds.), Ana-lytical and Stochastic Modelling Techniques and Applications (15th International Conference, ASMTA 2008, Nicosia, Cyprus, June 4-6, 2008, Proceedings). (Lecture Notes in Computer Science, Vol. 5055, pp. 189-205). Berlin: Springer.
- Al Hanbali, A., Haan, R. de, Boucherie, R.J., Ommeren, J.C.W. van (2008). Time-limited and k-limited polling systems: a matrix geometric solution. Proceedings 3rd International Workshop on Tools for Solving Structured Markov Chains (SMC Tools 2008, Athens, Greece, October 20, 2008; co-located with ValueTools 2008). (pp. 10). ICST.
- Al Hanbali, A., Ibrahim, M., Simon, V., Varga, E., Carreras, I. (2008). A survey of message delivery protocols in mobile ad hoc networks. Proceedings Workshop on Interdisciplinary Systems Approach in Performance Evaluation and Design of Computer & Communication Systems (Inter-Perf 2008, Athens, Greece, October 24, 2008; co-located with ValueTools 2008). (pp. 16). ICST.

Stelios Bekiros

- Bekiros, Stelios D. & Diks, Cees G.H., 2008. "The relationship between crude oil spot and futures prices: Cointegration, linear and nonlinear causality," Energy Economics, Elsevier, vol. 30(5), pages 2673-2685,
- S. D. Bekiros & D. A. Georgoutsos, 2008. "Direction-of-change forecasting using a volatility-based recurrent neural network," Journal of Forecasting, John Wiley & Sons, Ltd., vol. 27(5), pages 407-417
- Stelios Bekiros & Dimitris Georgoutsos, 2008. "Extreme returns and the contagion effect between the foreign exchange and the stock market: evidence from Cyprus," Applied Financial Economics, Taylor and Francis Journals, vol. 18(3), pages 239-254.
- Stelios Bekiros & Dimitris Georgoutsos, 2008. "Non-linear dynamics in financial asset returns: the predictive power of the CBOE volatility index," European Journal of Finance, Taylor and Francis Journals, vol. 14(5), pages 397-408.
- Bekiros, Stelios D. & Diks, Cees G.H., 2008. "The nonlinear dynamic relationship of exchange rates: Parametric and nonparametric causality testing," Journal of Macroeconomics, Elsevier, vol. 30(4), pages 1641-1650, December.
- Bekiros, Stelios D. & Georgoutsos, Dimitris A., 2008. "The extreme-value dependence of Asia-Pacific equity markets," Journal of Multinational Financial Management, Elsevier, vol. 18(3), pages 197-208, July.

P. Beekhuizen

- Beekhuizen, P., Denteneer, T.J.J., Adan, I.J.B.F. (2008). Analysis of a tandem network model of a single-router Network-on-Chip. Annals of Operations Research, 162(1), 19-34.
- Beekhuizen, P., Denteneer, T.J.J., Resing, J.A.C. (2008). Reduction of a polling network to a single node. Queueing Systems: Theory and Applications, 58(4), 303-319. (68M20 90B15).
- Beekhuizen, P., Denteneer, T.J.J., Resing, J.A.C. (2008). End-to-end delays in polling tree networks. Value Tools 2008 (Proceedings Third International Conference on Performance Evaluation Methodologies and Tools, Athens, Greece, October 20-24, 2008). (pp. 10). Gent: ICST.

Publications submitted:

- *Beekhuizen, Resing and Denteneer, Reduction of a polling network to a single node, submitted to Queueing Systems, accepted.*
- *Beekhuizen, Resing, End-to-end delays in polling tree networks, ValueTools proceedings, accepted.*
- *Major revision of 'Performance Analysis of Non-Uniform Switches in Networks on Chips' to Performance Evaluation. Minor revision needs to be submitted.*

M. Boon

- Boon, M.A.A., Adan, I.J.B.F. (2009). Mixed gated/exhaustive service in a polling model with priorities. Queueing Systems: Theory and Applications, ..., to appear.
- Boon, M.A.A., Adan, I.J.B.F., Boxma, O.J. (2008). A two-queue polling model with two priority levels in the first queue. Value Tools 2008 (Third International Conference on Performance Evaluation Methodologies and Tools, Athens, Greece, October 20-24, 2008, Proceedings). (pp. 10).
- Two-Queue Polling Model with Two Priority Levels in the First Queue, M. Boon, I. Adan, and O. Boxma, to be published in Discrete Event Dynamic Systems
- *Mixed Gated/Exhaustive Service in a Polling Model with Priorities,* M. Boon, and I. Adan, to be published in Queueing Systems.

Publications submitted

- *A Polling Model with Multiple Priority Levels. Submitted to Performance Evaluation.*

Josine Bruin

Publications submitted:

- *Fixed Cycle Single-Item Production Systems, J. Bruin and J. van der Wal.*
- *Special Issue of Annals of Operations Research on Advances in the Analysis of Manufacuting Systems.*
- *Waiting times in polling systems with various service disciplines Performance Evaluation, O.J. Boxma, J. Bruin and B. Fralix, Performance Evaluation*

Cagdas Büyükkaramikli

- Coordinated Replenishment in a Two Echelon Inventory System with Transportation Capacity, submitted to MSOM
- Lead Time Performance under Periodic Capacity Adjustment, submitted to IJPE

Brian Fralix

- Fralix, Brian H.; Adan, Ivo J. B. F. An infinite-server queue influenced by a semi-Markovian environment. Queueing Syst. 61 (2009), no. 1, 65--84. 60K25 (60K37)

Publications submitted:

- *EURANDOM report 2008-42: Another look at transient versions of Little's law, and M/G/1 preemptive Last-Come-First-Served queues. (joint work with Germán Riaño). This will be submitted to Queueing Systems.*
- *EURANDOM report 2008-19 is currently being revised for publication in Performance Evaluation.*
- *EURANDOM report 2008-25 An infinite-server queue influenced by a semi Markovian environmentt. has been resubmitted to Queueing Systems, and we are currently waiting on their response.*
- *EURANDOM report 2007-41 has been heavily revised, and will include new applications toward understanding the transient behavior of many types of queueing systems with preemptive behavior. Skip-free Markov chains, and birth and death processes are special cases of the systems mentioned above. This will be submitted to either Queueing Systems, or Advances in Applied Probability.*

Florence Guillaume

Jevgenijs Ivanovs

Publication submitted:
- *to "Stochastic Processes and their Applications": "Singularities of the generator of a Markov additive process with one-sided jumps"*

Henrik Jönsson

- "Convergence of option rewards for Markov type price processes modulated by stochastic indices" with Dmitrii Silvestrov, Malardalen University, Sweden, and Fredrik Stenberg, Nordea Bank AB, Sweden.
- Jönsson, H., and W. Schoutens "Single Name Credit Default Swaptions Meet Single Sided Jump Models", Review of Derivatives Research (2008) 11 (1-2), 153-169.
- D. Silvestrov, H. Jönsson, and F. Stenberg "Convergence of option rewards for Markov type price processes modulated by stochastic indices I", Theory of Probability and Mathematical Statistics 79 (2008).
- D. Silvestrov, H. Jönsson, and F. Stenberg "Convergence of option rewards for Markov type price processes modulated by stochastic indices II", Theory of Probability and Mathematical Statistics 80 (2009).
- Jönsson, H., W. Schoutens and G. van Damme "Modelling Default and Prepayment using L\'evy Processes: an Application to Asset Backed Securities", Radon Series Comp. Appl. Math 8 (2009)
- Jönsson, H., V. Masol, and W. Schoutens "Normal Invers Gaussian Model", Encyclopedia of Quantitative Finance (2009).
- Jönsson, H., Schoutens, W. (2009). Pricing constant maturity credit default swaps. The Journal of Credit Risk, 5(1), 1-21.

Publications submitted:
- *Boxma, O., Jonsson, H., Resing, J., and Shneer, S., AN ALTERNATING RISK RESERVE PROCESS - PART I, to be submitted to Insurance: Mathematics and Economics.*
- *Boxma, O., Jonsson, H., Resing, J., and Shneer, S., AN ALTERNATING RISK RESERVE PROCESS - PART II, to be submitted to Insurance: Mathematics and Economics.*

Yoav Kerner

- Kerner Y., The Conditional Distribution of the Residual Service Time in the Mn/G/1 Queue, Stochastic Models, 24, No. 3 (2008) 364-375.

Kamil Kosinski

- Kosinski, K.M. (2008). Asymptotics for sums of a function of normalized independent sums. Statistics and Probability Letters, 79(4), 415-419.
- Kosinski, K.M. (2008). On the functional limits for sums of a function of partial sums. Statistics and Probability Letters, ..., to appear.

Liqiang Liu

- L. Q. Liu, V. G. Kulkarni, Balking and Reneging in M/G/s Systems: Exact Analysis and Approximation, Probability in the Information and Engineering Sciences (PIES), 22 (3): 355 – 371 July 2008.
- L. Q. Liu, V. G. Kulkarni, Busy Period Analysis for M/PH/1 Queues withWorkload Dependent Balking, Queueing Systems (Queueing Syst.), 59 (1): 37 – 51 May 2008.

Publications submitted:
- *Some results of Liqiang's investigation in computing performance measures for non-product form queueing network, will be submitted*

Andreas Löpker

- Löpker, Andreas H.(NL-EIND-AND); van Leeuwaarden, Johan S. H. Transient moments of the TCP window size process. Journal of Applied Probability 45 (2008), no. 1, 163--175.

Publications submitted:

- *With O.Kella, "A Markov modulated growth collapse model", submitted to 'Probability in the Engineering and Informational Science'.*
- *With S. Bar-Lev, O. Boxma, A. Löpker, W. Stadje, F. v.d. Duyn Schouten "Group Testing Procedures with Quantitative Features and Incomplete Identification", submitted to 'Operations Research'*
- *With D.Perry, "Idle periods for the finite G/M/1 queue and the deficit at ruin for a cash risk model with constant dividend barrier", submitted to QUESTA*
- *With J.van Leeuwaarden, "Connecting renewal age processes and M/D/1 processor sharing queues through stick breaking", submitted to 'Stochastic Models'*

Vika Masol

- Masol, V. Ī.; Slobodyan, S. Ya. On the rate of convergence to the normal distribution of the number of false solutions of a system of nonlinear random Boolean equations. (Ukrainian) Teor. Ĭmovīr. Mat. Stat. No. 76 (2007), 105--116; translation in Theory Probab. Math. Statist. No. 76 (2008), 117--129
- Masol, V. Ī.; Popereshnyak, S. V. A theorem on the distribution of the rank of a random sparse Boolean matrix and some of its applications. (Ukrainian) Teor. Ĭmovīr. Mat. Stat. No. 76 (2007), 92--104; translation in Theory Probab. Math. Statist. No. 76 (2008), 103—116

Submitted:

- *Garcia, J., Goossens, S., Masol, V., and Schoutens, W. "Lévy Base Correlation", Submitted to Risk Magazine.*
- *Masol, V., Schoutens, W. "Comparing some alternative Lévy base correlation models for pricing and hedging CDO tranches", Submitted to Journal of Quantitative Finance*
- V.Masol and J.Teugels, Numerical Accuracy of Real Inversion Formulas for the Laplace Transform, EURANDOM Report 2009 – 044. This paper was submitted to Journal of Computational and Applied Mathematics

Gergeley Mincsovics

- Mincsovics, G.Z. (2008).Studies on tactical capacity planning with contingent capacities. Eindhoven: Technische Universiteit Eindhoven. (Co-)promotors.: prof.dr.ir. J.W.M. Bertrand, dr.ir. J. van der Wal, dr.ir. N.P. Dellaert).
- Mincsovics, G.Z. (2009). A staffing decision support methodology using a quality loss function : a cross-disciplinary quantitative study. International Journal of Nursing Studiesto appear.
- Mincsovics, G.Z., Dellaert, N.P. (2009). Stochastic dynamic nursing service budgeting. Annals of Operations Researchto appear.
- Mincsovics, G.Z., Dellaert, N.P. (2009). Workload-dependent capacity control in production-to-order systems. IIE Transactionsto appear.
- Mincsovics, G.Z., Tan, T., Alp, O. (2009). Integrated capacity and inventory management with capacity acquisiton lead times. European Journal of Operational Research, 196(3), 949-958.

Balakrishna Prabhu

- Load balancing in processor sharing systems
  E. Altman, U. Ayesta, and B. J. Prabhu.
  In Proc. of GameComm 2008, October 20, 2008, Athens, Greece. HAL Research Report
- Analysis of an M/G/1 queue with customer impatience and an adaptive arrival process
  O.J. Boxma, O. Kella, D. Perry, and B. J. Prabhu.
  In Proc. of IWAP 2008, July 7-10, 2008, Compiegne, France
- Scaling laws for file dissemination in P2P networks with random contacts
  R. Nuñez-Queija and B. J. Prabhu.
  In Proc. of IWQoS 2008, June 2-4, 2008, Enschede, The Netherlands.

Ingrid Reijnen

- Akker, J.M. van den, Baarsma, H., Hurink, J.L., Modelski, M.S., Paulus, J.J., Reijnen, I.C., Roozemond, D.A., Schreuder, J. (2008). Shunting passenger trains: getting ready for departure. In O. Bokhove, et al. (Eds.), *Proceedings of the sixty-third European Study Group Mathematics with Industry (SWI*

2008, Enschede, The Netherlands, January 28-February 1, 2008). (pp. 1-19). Enschede: Universiteit Twente.

Vsevolod Shneer

- Large deviations for random walks under subexponentiality: the big-jump domain (with D. Denisov and T. Dieker) - Annals of Probability, 36, 5, 1946-1991.
- A random multiple-access protocol with spatial interactions (with C. Bordenave and S. Foss) - accepted for publication in Advances in Applied Probability.

Publications submitted:
- *Instability of MaxWeight scheduling algorithms (with P. van de ven and S. Borst) - submitted to INFOCOM.*
- *An alternating risk reserve process - part I (with O. Boxma, H. Jonsson and J. Resing) - to be submitted to Insurance: Mathematics and Economics.*
- *An alternating risk reserve process - part II (with O. Boxma, H. Jonsson and J. Resing)to be submitted to Insurance: Mathematics and Economics.*

Peter van de Ven

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Ingrid Vliegen

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- Hoen, K.M.R., Güllü, R., -Houtum, G.J.J.A.N. van, Vliegen, I.M.H. (2008). *A simple and accurate approximation for the order fill rates in lost-sales assemble-to-order systems.* BETA publicatie : working papers 252, 32 p. pp.

Publications submitted:
- *Bušic;, A., Vliegen, I.M.H., Scheller-Wolf, A.A., A new method for comparing Markov chains: precedence relations on sets of states.*
- *Hoen, K.M.R., Güllü, R., van Houtum, G.J., Vliegen, I.M.H., 2008 , A simple and accurate approximation for the order fill rates in lost-sales Assemble-To-Order systems, Beta Working Paper.*
- *Vliegen, I.M.H., Kleingeld, P.A.M., van Houtum, G.J., Separate tools or tool kits: an exploratory study of engineers' preferences.*
- *Vliegen, I.M.H., Bušic;, A., Scheller-Wolf, A.A., van Houtum, G.J., Optimization of stock levels for service tool inventory.*

Sandra van Wijk

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- N. Litvak, M.U. Altaf, A.L. Barbu, D.I. Miretskiy, L. Mohammadi, E. Onur, J.C.H.W. in 't panhuis, J.H. Sumihar, M.H. Vellekoop, A.C.C. van Wijk, R.H. Bisseling, Increasing Detection Performance of Surveillance Sensor Networks. To appear in: Proceedings of the 63rd European Study Group Mathematics with Industry, University of Twente, 2008.

Random Spatial Structures

Sébastien Blachère

- S. Blachère, P. Haïssinsky, P. Mathieu Asymptotic entropy and Green speed for random walks on countable groups Annals of Probability 36 (2008) 3 1134-1152

Publications submitted:
- *S. Blachère, P. Haïssinsky, P. Mathieu.*
  Harmonic measures versus quasiconformal measures for hyperbolic groups, to be submitted to Inventiones Mathematicae

Dimitris Cheliotis

- Cheliotis, Dimitris. Localization of favorite points for diffusion in a random environment. Stochastic Processes and. Applications.Vol. 118 (2008), no. 7, 1159--1189.

Publications submitted:
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Anne Fey-den Boer

- March 18, 2008 Anne Fey-den Boer thesis *Sandpile models: The infinite volume model, Zhang's model and limiting shapes*. Vrije Universiteit Amsterdam. Prom.coprom.: Prof.dr. R.W.J. Meester & Dr. R.H.J. Redig
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Robert Fitzner

Markus Heydenreich

- November 5, 2008, PhD thesis "A lace-expansion analysis of random spatial models".
- M. Heydenreich, R. van der Hofstad and G. Radulov,
  Functionals of Brownian Bridges arising in the current mismatch in D/A converters.
  Probability in the Engineering and Informational Sciences 23 (1): 149-172 (2009)
- M. Heydenreich, R. van der Hofstad and A. Sakai,Mean-field behavior for long- and finite range Ising model, percolation and self-avoiding walk. Journal of Statistical Physics 132 (6): 1001-1049 (2008).
- G. Radulov, M. Heydenreich, R. van der Hofstad, J.A. Hegt and A.H.M. van Roermund, Brownian Bridge based statistical analysis of the DAC INL caused by current mismatch. IEEE Transactions on Circuits and Systems II: Express Briefs 54 (2): 146-150 (2007).

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- *M. Heydenreich and R. van der Hofstad Random graph asymptotics on high-dimensional tori. II. Volume, diameter and mixing time. Preprint (2009), 21 pages. submitted*
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- *M. Heydenreich and R. van der Hofstad, Random graph asymptotics on high-dimensional tori.Communications in Mathematical Physics 270 (2): 335-358 (2007).*
- *J. Gärtner and M. Heydenreich, Annealed asymptotics for the parabolic Anderson model with a moving catalyst. Stochastic Processes and their Applications 116 (11): 1511-1529 (2006).*

Wouter Kager

- Van der Hofstad, Remco; Kager, Wouter Pattern theorems, ratio limit theorems and Gumbel maximal clusters for random fields. J. Stat. Phys. 130 (2008), no. 3, 503--522.

- A local limit theorem for the critical random graph Remco van der Hofstad, Wouter Kager and Tobias Müller, Elect. Comm. in Probab. 14 122– 131 (2009).

Tobias Müller

- Müller, Tobias; Pór, Attila; Sereni, Jean-Sébastien Lower bounding the boundary of a graph in terms of its maximum or minimum degree. Discrete Math. 308 (2008), no. 24, 6581--6583.
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- Pattern theorems, ratio limit theorems and Gumbel maximal clusters for random fields Remco van der Hofstad and Wouter Kager, J. Stat. Phys. 130(3) 503– 522 (2008).
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Nicolas Pétrélis

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Artem Sapozhnikov

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Cristian Spitoni

- "Metastability for Reversible Probabilistic Cellular Automata with Self-Interaction" E.N.M. Cirillo, F.R. Nardi, C. Spitoni, Journal of Statistical Physics, Volume 132, Number 3 431—471 / August, 2008
- "Competitive nucleation in reversible Probabilistic Cellular Automata" E.N.M. Cirillo, F.R. Nardi, C. Spitoni in Physical Review E: Statistical, Nonlinear and Soft Matter Physics, 78(4), 040601-1/4

Publications submitted:

- *"Homogeneous nucleation for Glauber and Kawasaki dynamics in large volumes at low temperatures" A. Bovier, F.den Hollander, C. Spitoni in Annals of Probability*

Lihu Xu

- Olkiewicz, Robert(PL-WROC-P); Xu, Lihu(4-LNDIC); Zegarliński, Bogusław(4-LNDIC) Nonlinear problems in infinite interacting particle systems. Infin. Dimens. Anal. Quantum Probab. Relat. Top. 11 (2008), no. 2, 179--211
- 'Ergodicity of the finite and infinite dimensional \alpha-stable systems' collaborated with Boguslaw Zegarlinski from Imperial College London has been accepted by the journal of 'Stochastic Analysis and Applications'.

Statistical Information and Modelling

Dmitriy Danilov

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- Battery Management Systems: Accurate State-of-Charge Indication for Battery-Powered Applications, book by V. Pop, H.J. Bergveld, D. Danilov, P.P.L.Regtien, P.H.L. Notten, Springer, (2008), ISBN 978-1-4020-6944-4.
- Mathematical modelling of ionic transport in the electrolyte of Li-ion batteries, D. Danilov and P.H.L. Notten, (2008) Electrochimica Acta, Volume 53, Issue 17, Pages 5569-5578.
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- *P. Vermeulen, A. Ledovskikh, D. Danilov and P.H.L. Notten, Thermodynamics and kinetics of the thin film Magnesium-Hydrogen system. Acta Materialia, 2009, submitted to the journal for publication.*
- *Ledovskikh, D. Danilov, P. Vermeulen and P.H.L. Notten, Electrochemical modelling of hydrogen storage in hydride-forming materials. Electrochimica Acta, 2009, submitted to the journal for publication.*
- *Ledovskikh, D. Danilov, P. Vermeulen and P.H.L. Notten, Surface kinetic effects of hydrogen storage. Complete electrochemical kinetic model. Electrochimica Acta, 2009, in preparation for submission.*
- *Ledovskikh, D. Danilov, A. Ayeb and P.H.L. Notten, New hydride-forming materials: challenges towards a new generation of high energy density Nickel-Metal-Hydride batteries. Journal of Power sources, 2009, in preparation.*
- Li-ion electrolyte modeling: The impact of adding supportive salts, D. Danilov, and P.H.L.Notten, Journal of Power Sources, submitted.

Ambedkar Dukkipati

Submitted:

- *Towards algebraic methods for maximum entropy estimation (…)*

Shota Gugushvili

- van Es, Bert; Gugushvili, Shota Weak convergence of the supremum distance for supersmooth kernel deconvolution. Statistics and Probability Letters 78 (2008), no. 17, 2932—2938
- van Es, Bert; Gugushvili, Shota; Spreij, Peter Deconvolution for an atomic distribution. Electron. J. Stat. 2 (2008), 265—297.
- Gugushvili, S. (2009). Nonparametric estimation of the characteristic triplet of a discretely observed Lévy process. Journal of Nonparametric Statistics, 21(3), 321-343.

Publications submitted:

- *Van Es B. and Gugushvili S., Asymptotic normality of the deconvolution kernel density estimator under the vanishing error variance. Submitted to J. Statist. Plann. Inference.*

Efang Kong

- Statistical Modelling of Nonlinear Long-Term Cumulative Effects, E. Kong, H. Tong and Y. Xia, accepted for publication, Statistica Sinica.
- Uniform Bahadur Representation for Local Polynomial Estimates of M-Regression and Its Application to The Additive Model, E. Kong, O.
- Linton and Y. Xia, accepted for publication, Econometric Theory

Publications submitted:

- *A Quantile Single-Index Model And Its Estimation+ Econometrica+2010*
- *Estimation of A general Single-Index Model, to be submitted to Econometrica*

Mikhail Langovoy

- Langovoy, M. A. (D-GTN-ST) Data-driven efficient score tests for deconvolution hypotheses. Inverse Problems 24 (2008), no. 2, 025028, 17 pp

Alexander Ledovskikh

- Ledovskikh, D. Danilov and P.H.L. Notten, Equilibrium kinetics of chemisorption processes. ChemPhysChem, 7, 1040-1045, 2008.
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- Ledovskikh, A., Danilov, D. & Notten, P.H.L. (2008). Equilibrium kinetics of chemisorption processes. ChemPhysChem, 9(7), 1040-1045.

Submitted:

- *P. Vermeulen, A. Ledovskikh, D. Danilov and P.H.L. Notten, Thermodynamics and kinetics of the thin film Magnesium-Hydrogen system. Acta Materialia, 2009, submitted to the journal for publication.*
- *Ledovskikh, D. Danilov, P. Vermeulen and P.H.L. Notten, Electrochemical modelling of hydrogen storage in hydride-forming materials. Electrochimica Acta, 2009, submitted to the journal for publication.*
- *A. Ledovskikh, D. Danilov, P. Vermeulen and P.H.L. Notten, Surface kinetic effects of hydrogen storage. Complete electrochemical kinetic model. Electrochimica Acta, 2009, in preparation for submission.*
- *A. Ledovskikh, D. Danilov, A. Ayeb and P.H.L. Notten, New hydride-forming materials: challenges towards a new generation of high energy density Nickel-Metal-Hydride batteries. Journal of Power sources, 2009, in preparation.*

Guangming Pan

- Pan, Guangming; Miao, Baiqi; Jin, Baisuo Central limit theorem of random quadratics forms involving random matrices. Statistics and Probability Letters 78 (2008), no. 6, 804--809.
- Pan, G. & Zhou, W. (2008) Central limit theorem for signal-to-interference ratio of reduced rank linear receiver. The Annals of Applied Probability, 18(3), 1232-1270

In 2008 **56 EURANDOM reports** were written, while The website of the department of Mathematics and Computer Sciences mentions **74 external publications**.
http://oametuep.uci.ru.nl/metue/pk_apa_n.onderzoek?p_url_id=4953

4.2. EURANDOM report series per programme

Queueing and Performance Analysis

2008-003
The Impact of Reneging in Processor Sharing Queues
Ch. Gromoll, Ph. Robert, B. Zwart, and R.Bakker

2008-004
Fluid model for a deat network with {alpha}-fair bandwidth sharing and general document size distributions: two examples of stability
Ch. Gromoll, and R. Williams

2008-005
Fluid Limits for Networks with Bandwidth Sharing and General Document Size Distributions
Ch. Gromoll, and R. Williams

2008-007
Reduction of a polling network to a single node
P. Beekhuizen, D. Denteneer, and J. Resing

2008-010
On a generic class of two-node queueing systems
I. Adan, M. Mandjes, W. Scheinhardt, and E. Tzenova

2008-012
Comparing some alternative Lévy base correlation models for pricing and hedging cdo tranches
V. Masol, and W. Schoutens

2008-014
On Lévy-driven vacation models with correlated busy periods and service interruptions
O. Kella, O. Boxma, and M. Mandjes

2008-016
A Two-Queue Polling Model with Two Priority Levels in the First Queue
M. Boon, I. Adan, and O. Boxma

2008-019
Waiting times in polling systems with various service disciplines
O. Boxma, J. Bruin, and B. Fralix

2008-023
Conditional ages and residual service times in the M/G/1 queue
I. Adan, and M. Haviv

2008-025
An infinite-server queue influenced by a semi-Markovian environment
B. Fralix, and I. Adan

2008-027
Two-stage queueing network models for quality control and testing
S. Bar-Lev, O. Boxma, W. Stadje, F. van der Duyn Schouten, and Ch. Wiesmeyr

2008-028
Fixed Cycle Single-Item Production Systems
J. Bruin, and J. van der Wal

2008-029
A Polling Model with Multiple Priority Levels
M. Boon, I. Adan, and O. Boxma

2008-030
Synchronized reneging in queueing systems with vacation
I. Adan, A. Economou, and S. Kapodistria

2008-032
Aggregate modelling of multi-processing workstations
A.A.A. Kock, L.F.P. Etman, J.E. Roorda, I.J.B.F. Adan, M. van Vuuren and A. Wierman

2008-036
Exact Asymptotics for the Stationary Distribution of a Markov Chain: a Production Model
I. Adan, R. Foley, and D. McDonald

2008-037
Singularities of the Generator of a Markov Additive Process with One/Sided Jumps
J. Ivanovs, O. Boxma, and M. Mandjes

2008-039
The age of the arrival process in the M/G/1 and M/G/1 queues
Y. Kerner, and M. Haviv

2008-040
A Two-Stage Group Testing Model for Infections with Window Periods
S. Bar-Lev, O. Boxma, W. Stadje, and F. van der Duyn Schouten

2008-041
Convergence of option rewards for Markov type price processes modulated by stochastic indices
D.S. Silvestrov, H. Jönsson, and F. Stenberg

2008-042
Another look at transient versions of Little's law, and pre-emptive Last-Come-First-Served queues
Brian Fralix, and G. Riaño

2008-043
Price of Anarchy int he Markovian Single Server Queue
G. Gilboa-Freedman, R. Hassin, and Y. Kerner

2008-044
Numerical Accuracy of Real Inversion Formulas for the Laplace Transform
V. Masol, and J. Teugels

2008-045
Mixed Gated/Exhaustive Service in a Polling Model with Priorities
M. Boon, and I. Adan

2008-046
Idle periods for the finite G/M/1 queue and the deficit at ruin for a cash risk model with constant dividend barrier
A. Löpker, and D. Perry

2008-047
Group Testing Procedures with Quantitative Features and Incomplete Identification
S. Bar-Lev, O. Boxma, A. Löpker, W. Stadje, and F. v.d. Duyn Schouten

2008-050
A Markov modulated growth collapse model
O. Kella, and A. Löpker

2008-052
Refining square root safety staffing by expanding Erlang C
A. Janssen, J. van Leeuwaarden, and B. Zwart

2008-053
Back to the Roots of the M/D/s queue and the works of Erlang, Crommelin, and Pollaczek
A. Janssen, and J. van Leeuwaarden

2008-054
Equidistant Sampling for the Maximum of a Brownian Motion with Drift on a Finite Horizon
A. Janssen, and J. van Leeuwaarden

2008-055
Asymptotic Inversion of the Erlang B Formula
J. van Leeuwaarden, and N. Temme

2008-056
Transient Behavior of the Halfin-Whitt Diffusion
J. van Leeuwaarden, and Ch. Knessl

Random Spatial Structures

2008-002
A polymer in a multi-interface medium
F. Caravenna, and N. Pétrelis

2008-006
Abelprijs 2007: S.R. Srinivasa Varadhan
F. den Hollander

2008-013
Acyclic and frugal colourings of graphs
R. Kang, and T. Müller

2008-015
Circular choosability is rational
T. Müller, and R.J. Waters

2008-017
Connecting renewal age processes and M/D/1 processor sharing queues through stick breaking
J. van Leeuwaarden, A. Löpker, and A. Janssen

2008-018
Power series approximation for generalized processor sharing systems
J. Walraevens, J. van Leeuwaarden, and O. Boxma

2008-020
The spectrum of the random environment and localization of noise
D. Cheliotis, and B. Virág

2008-021
Homogeneous nucleation for Glauber and Kawasaki dynamics in large volumes at low temperatures
A. Bovier, F. den Hollander, and C. Spitoni

2008-022
A local limit theorem for the critical random graph
R. van der Hofstad, W. Kager, and T. Müller

2008-024
Harmonic measures versus quasiconformal measures for hyperbolic groups
S. Blachére, P. Haïssinsky, and P. Mathieu

2008-031
On the localized phase of a copolymer in an emulsion: subcritical percolation regime
F. den Hollander, and N. Pétrélis

2008-033
Competitive nucleation in reversible Probabilistic Cellular Automata
E. Cirillo, F. Nardi, and C. Spitoni

2008-034
Quenched large deviation pricipal for words in a letter sequence
M. Birkner, A. Greven, and F. den Hollander

2008-038
Long-range self-avoiding walk converges to (alpha)-stable processes
M. Heydenreich

2008-048
Intermittency on catalysts: three-dimensional simple symmetric exclusion
J. Gärtner, F. den Hollander, and G. Maillard

2008-049
Collision local time of transient random walks and intermediate phases in interacting stochastic systems
M. Birkner, A. Greven, and F. den Hollander

2008-051
Ergodicity if the finite and infinite dimensional alpha-stable systems
L. Xu, and B. Zegarlinski

Statistical Information and Modelling

2008-001
Some thoughts on the asymptotics of the deconvolution kernel density estimator
S. Gugushvili, and B. van Es

2008-008
Nonparametric Bayesian model selection and averaging
S. Ghosal, J. Lember, and A. v.d. Vaart

2008-009
On universal Bayesian adaptation
J. Lember, and A. v.d. Vaart

2008-011
Weak convergence of the supremum distance for supersmooth kernel deconvolution
B. van Es, and S. Gugushvili

2008-026
Quantile Estimation of a General-Index Model
Efang Kong, and Y. Xia

2008-035
On parametric and implicit algebraic descriptions of maximum entropy models
A. Dukkipati

Distribution per programme:

QPA	**34**
RSS	**16**
SIM	**6**
	56

5. ACTIVITIES

5.1. Workshops and Conferences in 2008

January 9 -12, 2008 (RSS)
Workshop "Metastability"

March 10 - 14, 2008 (RSS)
YEP V – Young European Probabilists
"Statistical Mechanics on Random Structures"

July 18 - 28, 2008 (RSS)
Mini-workshop "Random Interactions and Statistical Mechanics"

August 26 - 28, 2008 (GEN)
10th Anniversary EURANDOM
"A Random Tour through a Decade of Research"

October 6 - 8, 2008 (SIM)
YES II - Young European Statisticians
"High dimensional statistics"

October 22 - 24, 2008 (QPA-MVR)
"Handling and modelling of assett backed securities"

November 3 - 7, 2008 (RSS)
"Hitting, returning and matching in dynamical systems, information theory & mathematical biology"

November 24 - 26, 2008 (SIM)
"Locally adaptive filters in signal and image processing"

December 1 - 3, 2008, (QPA)
YEQT-II - Young European Queueing Theorists
"Stochastic Analysis of Modern Communication Networks"

Furthermore, the Fifth European Congress of Mathematics, July 14 - 18, 2008 was co-sponsored by EURANDOM

Details on the workshops

January 9 – 11, 2008 – (RSS)
Metastability

Organizers:
A. Bovier (Berlin), F. den Hollander (Leiden) and F.R. Nardi (Eindhoven).

Participants: 35

The main focus was on recent progress for metastable behaviour of stochastic spin and particle systems.
A total of 35 researchers attended the workshop, with a particularly strong participation of France, Germany and Italy, countries where metastability has traditionally been strong. A total of 6 longer lectures and 6 shorter lectures was organised, with a long break in the afternoon for informal discussions.

Metastability is a ubiquitous phenomenon in nature, with examples coming from physics, chemistry, biology, climatology and economics. The object of interest is the evolution of systems that make transitions between "metastable states", i.e., quasi-equilibria that appear to be equilibria on large time

scales. When being in such a metastable state, the system explores a confined section of the phase space on a short time scale, and makes transitions between different sections of the phase space on a large time scale. The goal is to develop a mathematical theory for such behaviour.
It is challenging to develop metastability in a broad context, clearing out what parts of the theory are general and what parts are model dependent. Universality is a key notion, with many systems showing similar behaviour on large time scales.
Much work focusses on the geometry of "critical droplets" that trigger the metastable crossover and on the typical trajectories of the system that lead to the crossover.
Two lines of research have been very successful in the past: (1) the path-wise approach, which is probabilistic in nature; (2) the potential-theoretic approach, which is analytic in nature. There is currently much active and high-speed research along both lines, with particularly interesting developments at the interface.
The workshop focussed on systems of spins and particles subject to a stochastic dynamics driven by an "interaction Hamiltonian", i.e., an energy functional on configuration space. Key examples discussed during the workshop were: Glauber dynamics for Ising spins, Kawasaki dynamics for lattice gas particles, and probabilistic cellular automata.
The workshop was unique in bringing together a core group of researchers who are close scientifically and inviting them to share their latest results. The sharp focus on metastability made this workshop unique and effective. About half of the participants were young researchers, who were offfered a panorama of metastability at the interface between probability theory, statistical physics and dynamical systems.
The workshop has been sponsored by NWO.

March 10-14, 2008 – (RSS)
YEP V – Young European Probabilists
Statistical Mechanics on Random Structures

Organizers:
Professors P. Contucci (Bologna University) and C. Giardina (Eindhoven University of Technology / EURANDOM).

Participants: 58

The YEP-V workshop is the fifth in a successful series of YEP (Young European Probabilists) meetings at EURANDOM in the years 2004 - 2007. This year, the main focus of the workshop has been the investigation of the large scale behaviour of systems whose interaction network is modelled by random graphs. Statistical mechanics is now more than three decades away from the introduction of disordered interactions in the case of spin glasses (Mezard, Parisi, Virasoro "Spin Glass Theory and Beyond", 1987). Beyond its original scope of modelling certain magnetic alloys in condensed matter physics, the proposed statistical mechanics formalism has proved to be extremely useful to analyze problems in a variety of areas as diverse as combinatorial optimisation and neural networks, with applications to biological, economical and social sciences. The rich mathematical structure of spin glasses is nowadays a leading research topic in probability theory (M. Talagrand, "Spin glasses: a challenge to mathematicians", 2003) and it can be seen as a first attempt to introduce randomness in an interacting system. Recently, diluted spin glasses have moved the theory forward, adding a new source of randomness in the connectivity property of the interaction network, like those of Erdiös-Rényi random graphs. They are also relevant in computer science, since many random optimization problems are mapped in a natural way into the study of ground states of diluted mean-field spin glass models (for example the K-sat model has been solved within the framework of "one-step replica symmetry breaking").
Complex networks emerging in real systems (found in biology, social sciences, and internet and power grids) have revealed interesting properties of small world (Watts, 1999) and scale free type (Barabasi, 2002) which led to an explosive development of the mathematical theory of random graphs. The modelling of complex networks has given rise to a large number of random graphs models, in which some correlations structure is introduced in the model, for example the so-called "preferential attachment" type. The necessity to build a theory of interacting particles on random networks is a step to be naturally pursued in the near future.
The workshop did bring together scholars whose interest lies in the intersection of disordered statistical mechanics and random graphs with a clear emphasis on applications.
The workshop incorporated two mini-courses by:

Francesco Guerra (University Roma 1, La Sapienza): "Probabilistic aspect of spin glass theory" and Hidetoshi Nishimori (Tokyo Institute of Technology): "Combinatorial optimization problems and quantum annealing".
There have also been contributed talks by the participants, as well as talks by leading experts in the field: A. Bovier (Weierstrass Institute, Berlin) R. v.d.Hofstad (TU Eindhoven & EURANDOM) J. Kurchan (ESPCI, Paris,), E. Marinari (University Roma 1, La Sapienza) and R. Zecchina (Politecnico Torino).
One should notice that this year the workshop also featured the participation of young researchers coming from outside Europe. This is a signal that the workshop, after its fifth edition, has greatly enlarged its visibility. There will also be a Special Issue of Journal of Mathematical Physics where selected contributions from the workshop participants will be invited to appear.
The workshop has been sponsored by NWO, Thomas Stieltjes Institute, Università di Bologna, KNAW and TU/e.

July 18 – 28, 2008 – (RSS)
Mini-workshop Random Interactions and Statistical Mechanics

Organizers:
Cristian Giardina (Eindhoven University of Technology and EURANDOM) and Pierluigi Contucci (University of Bologna)

Participants: 9

Topic: The idea of this mini-workshop originated during the YEP-V meeting. The participants felt the need to gather in an informal atmosphere to work on the themes that were presented during the YEP meeting. Seminars followed by discussions, groups work and questions to external experts have been the successful implementation of this idea. The themes treated:
1) Models of disordered system and spin glasses. Concentration of measure for the free energy difference after a flip of the couplings.
2) Application of statistical mechanics models to social systems. The problem of estimating parameters from real data. We acknowledge useful discussions with Laurie Davis.
The workshop has been entirely financed by Bologna University.

August 26 – 28, 2008 (GEN)
10th Anniversary EURANDOM
A Random Tour through a Decade of Research

Organizers:
Onno Boxma, Alessandro di Bucchianico (both TU/e and EURANDOM), Peter van de Ven and Peter Grünwald (EURANDOM and CWI)

Participants: 100

Main items on the programme: Lectures by top researchers in the field of probability, stochastic operations research and statistics: Gordon Slade (University of British Columbia, CA), Frank Kelly (University of Cambridge, UK) and Jan Beirlant (KU Leuven, Belgium).
Six former EURANDOM postdocs gave a presentation.
Three lectures were on industrial applied topics, especially in areas were EURANDOM was active in collaboration with industry.
Around 20 EURANDOM postdocs and PhD students gave 2-minute presentations on their work. During lunches and breaks there was a possibility to go into further details illustrated with posters. The Journal Statistica Neerlandica issued a special number (Vol. 62, August 2008) dedicated to EURANDOM and the lectures from former postdocs and the industrial oriented lectures.
The conference was sponsored by NWO, the JW Cohen Foundation, Philips Research and Eindhoven municipality.

October 6 – 8, 2008 (SIM)
YES II - Young European Statisticians
High Dimensional Statistics

Organizer:
Laurie Davies, University of Duisburg-Essen, Germany / Eindhoven University of Technology, Eindhoven / EURANDOM

Participants: 36

The 36 participants (23 men, 13 women) came from eight European countries: Austria (3), Belgium (3), Germany (6), United Kingdom (4), The Netherlands (14), Italy (2) and Switzerland (4). The goal of the workshop was to acquaint young researchers (PhD students and postdocs) with the methods and the latest results in the area of high dimensional statistics. High dimensional statistics is an important branch of research in current applied and theoretical statistical practice with applications in biology, medicine, engineering, astronomy, physics and chemistry. The invited main talks were given by Gilles Blanchard, Berlin(three talks of 45 minutes on PAC-Bayes bounds in learning theory, randomized algorithms, more recent related results, connection to multiple testing, examples of applications), Nicolai Meinshausen, Oxford (two talks of 45 minutes on sparsity, consistent variable selection for high dimensional data using an L1--penalty, requires assumptions and their failure, a running example on climate change) and Sara van de Geer, Zürich (three talks of 45 minutes on the theory of empirical processes, concentration and contraction inequalities, bound for minimal empirical risk, non-standard asymptotic distribution theory, classification problems and general oracle inequalities). The PhD students and PDs had the possibility of giving shorter talks of 20 minutes on their own research: Thirteen of the 29 PhD students and PDs made use of this opportunity and gave talks which ranged from the choice of bandwith for Kernel estimators to the graphical representation of missing data.
The workshop was sponsored by the Volkswagen Stiftung and TU/e.

October 22 – 24, 2008 (QPA-MVR)
Handling and modelling of assett backed securities

Organizers: Wim Schoutens (EURANDOM / KULeuven), Jef Teugels (EURANDOM / KU Leuven) and Henrik Jönsson (EURANDOM)

Participants: 32

ABSs are notes based on pools of assets, or collateralized by the cash flows from a specified pool of underlying assets. On the side of the originator one of the most important features behind "securitization" is the separation between the collateral (the underlying asset pool) and the originator. In recent years with the advent of Basel II, the efficient use of capital and the integration of the European capital market, the European securitization market has increased significantly.
The workshop focussed on the handling and the modelling of Asset- Backed Securities. Special attention was to be paid to rating models and some recent developments in the credit risk world.
This workshop is part of the EIB funded project "Quantitative analysis and analytical methods to price securitization deals".
The workshop included a special training by Luke Mellor (Creative Capital Partners) on ABS Cash Flow modelling and Rating Agencies. The training was a hands-on course where time was devoted to the theoretical background as well as to the implementation of the models. Delegates learned how to programme and analyze real ABS deals.

After the one-day and a half training, lectures from practitioners were given on current issues of ABSs; special attention was given to the current financial crisis. Speakers from Benelux banks as well as regulators presented their views.

The last day, an overview of more academic work was given by mostly junior researchers on related topics, like pricing of credit risk derivatives, multivariate credit models and its numerical implementations. The open part of the workshop was well attended.
This workshop was held in the framework of the EIB funded project "Quantitative analysis and analytical methods to price securitization deals".

November 3 – 7, 2008 ((RSS)
Hitting, returning and matching in dynamical systems, information theory & mathematical biology

Organizors:
Jean René Chazottes (École Polytechnique, France) Frank den Hollander (EURANDOM / Mathematical Institute Leiden University), Frank Redig (Mathematical Institute Leiden University)

Participants: 38

In this workshop we aim to bring together people from ergodic theory, probability, information and mathematical biology. The common themes were: alignment, matching, return times and entropy, approximate matching and data compression, occurrence of words in biological sequences.
We had three mini-courses. Benoit Saussol introduced quantitative Poincaré recurrence in the context of ergodic theory (interval maps). Sophie Schbath introduced occurrence of words in DNA sequences and reported on the discovery of chi-motives in bacteria, using probabilistic techniques.
Ioannis Kontoyiannis introduced the point of view of information theory in presenting the connection between waiting times and entropy, as well as approximate matching and the rate distortion function.
Besides the mini-courses we had several talks covering the three areas of the workshop. Highlights were the talks of Downarrowic and Lacroix on the law of series, and Weiss about Kac lemma for Zd-actions.
Zweimuller and Kessebohmer covered return times in infinite ergodic theory, whereas Freitas discussed extreme value theory in the context of dynamical systems.
There were also valuable contributions from young people such as Nicolas Vergne about the psi-mixing method in DNA-sequence analysis, and David Coupier about Poisson laws for patterns in the Ising model.
Summarizing, we had an exciting workshop in which a real flow of information between different areas was realized, and several interesting research topics were coined.
Sponsoring came from: NWO, Thomas Stieltjes Institute, NDNS +- Cluster, KNAW, and MRI.

November 24 - 26, 2008 (SIM)
Locally adaptive filters in signal and image processing

Organizers:
Laurie Davies (University Duisburg-Essen / TU/e and EURANDOM), Remco Duits (TU/e), Luc Florack (TU/e) and Marie-Colette van Lieshout (CWI / TU/e and EURANDOM)

Participants: 34

The workshop was the third in a series of annual workshops at EURANDOM devoted to signal and image analysis. It was devoted to locally adaptive methods in image analysis and signal processing. Such methods are required where there is considerable local variability in the nature of the data. Examples include denoising, edge detection, classification and segmentation.
There were 34 participants (33 men, 1 woman) who came from eight countries: Canada (1), Czech Republic (4), France (3), Germany (9), The Netherlands (11) Israel (1), Poland (4), and Sweden (1). Amongst these, fifteen were invited speakers each of whom gave a talk of 45 minutes. The topics ranged from models for line propagation, local adaptive triangulations and image compression, structural adaptive smoothing in diffusion tensor imaging to the denoising of dynamical images and visual data recognition using local Markovian models. The standard of the talks was uniformly high and the workshop succeeded in its intentions of bringing together people who work on similar problems but use different paradigms.
The workshop has been sponsored by NWO, KNAW, and the Thomas Stieltjes Institute

December 1 – 3, 2008 (QPA)
YEQT-II - Young European Queueing Theorists
Stochastic Analysis of Modern Communication Networks Theorists

Organizers: Matthieu Jonckheere (TU/e), Marc Lelarge, (ENS Paris, France), Vsevolod Shneer (TU/e and EURANDOM)

Participants: 56

The YEQT II workshop was devoted to various topics focusing on the analysis of modern communication networks.
There were more than 50 participants among which some of the most active researchers in this area, 2 keynote talks of one hour, 2 tutorials of two hours and 18 talks given by young researchers working in the field.
Keynote talks were presented by Michel Mandjes (University of Amsterdam, CWI, and EURANDOM) and Laurent Massoulié (Thomson Research, Paris). Tutorials were given by Alexandre Proutière (Microsoft Research, Cambridge) and Patrick Thiran (EPFL, Lausanne).
In addition, many informal scientific discussions took also place attesting the importance and the success of such meetings.
The workshop was sponsored by KNAW, NWO, and the Thomas Stieltjes Institute

Summary of the workshops:

QPA-MVR	2
RSS	4
SIM	2
General	1
Total	9

Total number of participants: 404.

5.2. Lectures and Seminars

In 2008 EURANDOM organized the following seminar series: 101

Queueing and Performance Analysis (QPA): 29
QPA seminar: 21
QPA-MVR seminar: 3
QPA Reading seminar: 5

Random Spatial Structures (RSS): 25

Statistical Information and Modelling (SIM): 25
The SIM seminar is a cooperative action with the Department of Mathematics and Computer Science: 2
Informal meetings Eindhoven statisticians: 23

General: 22
EURANDOM Postdoc and PhD seminar (EPPS): 12
Philips lectures: 3
Lectures by the EURANDOM Chair: 6.(including the Public Lecture)
Unlikely Evening with EURANDOM, Public Evening: 1

Abstracts and presentations can be downloaded from the EURANDOM website.

December 19, 2008 Sandra Kliem, Department of Mathematics, UBC, Vancouver, Canada Degenerate Stochastic Differential Equations for Catalytic Branching Systems	RSS
December 16, 2008, Lecture III - Shankar Bhamidi, University of California, Berkeley, USA The (Unreasonable) Effectiveness of Local Weak Convergence Methodology in Probability	RSS
December 16, 2008, EPPS Henrik Jönsson (EURANDOM) Jumping to Default – Credit Risk Modeling with Lévy Processes	EPPS/ GEN
December 11, 2008, QPA Reading seminar	QPA

December 10, 2008, Informal meeting Eindhoven statisticians Joris van Iersel, Essent Trading Time Series Based Clustering of Energy Demand	SIM
December 10, 2008, Dmitriy Kim, Kazakh National University (visiting Heriot-Watt University) Ruin probability for a process with switching	QPA
December 9, 2008, Lecture II - Shankar Bhamidi, University of California, Berkeley, USA The (Unreasonable) Effectiveness of Local Weak Convergence Methodology in Probability	RSS
December 5, 2008, Lecture I - Shankar Bhamidi, University of California, Berkeley, USA The (Unreasonable) Effectiveness of Local Weak Convergence Methodology in Probability	RSS
December 3, 2008, 11.30-12.30 h., HG 9.41 Informal meeting Eindhoven statisticians Katya Lyakhova, Department of Chemical Engineering and Chemistry, Technische Universiteit Eindhoven Calculation of the three component phase diagram (the mixture of a liquid crystal, colloidal particles and a nonmesogenic solvent)	SIM
November 27, 2008, 10.30 h. -12.00 h., LG 1.110 (QPA) Reading seminar	QPA
November 25, 2008, 13:30-12.30 h., LG 1.105 EPPS Markus Heydenreich, Eindhoven University of Technology	EPPS/ GEN
November 24, 2008, 11.00 - 12.00 h., LG 1.110 Martin Hutzenthaler, Dutch-German DFG/NWO research group Convergence to the Virgin Island Model	RSS
November 13, 2008, 10.30 h. -12.00 h., LG 1.110 QPA Reading seminar	QPA
November 11, 2008, 14.00-15.00 h., LG 1.105 EPPS Jevgenijs Ivanovs , EURANDOM Markov additive processes with one-sided jumps	EPPS/ GEN
November 5, 2008, 12.00-13.00 h., HG 6.29 Informal meeting Eindhoven statisticians	SIM
October 30, 2008, 10.30 h. -12.00 h., LG 1.110 QPA Reading seminar	QPA
October 29, 2008, 11.30-12.30 h., HG 6.29 Informal meeting Eindhoven statisticians	SIM
October 23, 2008 (GEN) 19.30-22.15 h. "An unlikely evening with EURANDOM"	GEN
October 22, 2008, 11.30-12.30 h., HG 9.41 (Diamant Room) Informal meeting Eindhoven statisticians	SIM
October 15, 2008, 11.30-12.30 h., LG 1.105 Informal meeting Eindhoven statisticians	SIM
October 14, 2008, 14.00-15.00 h., LG 1.105 EPPS Cristian Spitoni, EURANDOM Competitive nucleation in Probabilistic Cellular Automata	EPPS/ GEN
October 7, 2008, 11.30-12.15 h., LG 1.10 Shaul Bar-Lev, University of Haifa, Israel Alternatives to the Poisson distribution for modelling mortality projections	QPA
October 1, 2008, 11.30-12.30 h., HG 9.41 (Diamant room) Informal meeting Eindhoven statisticians K. Lyakhova, Eindhoven University of Technology, Physics department	SIM

September 26, 2008, 16.00-17.00 h., LG 1.105 S. Plasman, M. Janssen, P. Donkers, G. Vinken (all TU/e) Complex networks: examples and preferential attachment models with high clustering	RSS
September 24, 2008, 11.30-12.30 h., LG 1.110 Informal meeting Eindhoven statisticians ....open call for problems....	SIM
September 17, 2008, 11.30-12.30 h., HG 9.41 (Diamant room) Informal meeting Eindhoven statisticians ....open call for problems....	SIM
September 10, 2008, 11.30-12.30 h., HG 9.41 (Diamant room) Informal meeting Eindhoven statisticians H. Beers, Eindhoven University of Technology & Tilburg University	SIM
September 9, 2008, 14.30 - 15.30 EPPS Peter van de Ven, EURANDOM and Department of Mathematics and Computer Science, TU/e Instability of MaxWeight Scheduling Algorithms	EPPS/ GEN
September 3, 2008, 10.30-11.15, LG 1.105 Offer Kella, University of Jerusalem A collector's problem with renewal arrival times	QPA
September 3, 2008, 11.30-12.30, LG 1.105 René Bekker, VU Amsterdam Queues with Lévy input and threshold-based control	QPA
August 26, 2008, 11.30-12.30 h., LG 1.105 Z. Palmowski, University of Wroclaw De Finetti's dividend problem for a general Lévy insurance risk process	QPA
August 19, 2008, 14.30 - 15.30 h. LG 1.105 EPPS Ingrid Vliegen, EURANDOM and Department of Technology Management, TU/e Optimization of stock levels for service tool inventory	EPPS/ GEN
August 5, 2008, 14.30 - 15.30 h., LG 1.105 EPPS Marko Boon, EURANDOM and Department of Mathematics and Computer Science, TU/e A Two-Queue Polling Model with Two Priority Levels in the First Queue	EPPS/ GEN
July 11, 2008, 10.30-12.45 h., 2008, LG 1.105 LECTURE SERIES V by EURANDOM Chair David Brydges, University of British Columbia, Canada	GEN
July 9, 2008, 14.00-15.00 h., LG 1.105 G. Winkler, Helmholtz Zentrum München Complexity penalised M-estimators for time-series and image data	SIM
July 4, 2008, 13.30-14.30 h., LG 1.105 Anton Klymovskiy, Institut für Mathematik, Technische Universität Berlin Hierarchical structures in the large sums of non-hierarchically correlated random exponentials	RSS
July 4, 2008, 10.30-12.45 h., 2008, LG 1.110 LECTURE SERIES IV by EURANDOM Chair David Brydges, University of British Columbia, Canada	GEN
July 1, 2008, 11.00-12.00 h., LG 1.105 Liqiang Liu, EURANDOM Busy Period Analysis for M/PH/1 Queues with Workload Dependent Balking	QPA
June 27, 2008, 15.15-16.15 h., LG 1.105 Ross J. Kang, McGill, Montreal Acyclic and frugal colourings of graphs	RSS
June 27, 2008, 14.00 - 15.00 h., LG 1.105 EURANDOM Dee Denteneer - Philips Research Throughput limitations in CSMA-type networks	Phil/ GEN

June 27, 2008, 10.30-12.45 h., 2008, LG 1.105 LECTURE SERIES (III) by EURANDOM Chair David Brydges, University of British Columbia, Canada	GEN
June 25, 2008, 11.00-12.00 h., HG 9.41 (Diamant room) Informal meeting Eindhoven statisticians	SIM
June 24, 2008, 14.00-15.00 h., LG 1.105 Urtzi Ayesta, CNRS The mathematics of traffic in networks	QPA
June 24, 2008, 11.45-12.45, LG 1.105 Hans Blanc, Tilburg University Markov chains with uncertain data	QPA
June 20, 2008, 13.30-14.30, LG 1.105 Artem Sapozhnikov, CWI Relations between invasion percolation and critical percolation in 2D	RSS
June 20, 2008, 10.30-12.45 h., 2008, LG 1.105 LECTURE SERIES (II) by EURANDOM Chair David Brydges, University of British Columbia, Canada	GEN
June 18, 2008, 14.15-15.15 h., LG 1.105 Lisa Chen, Department of Statistics, Auckland Finding User Equilibrium Policies for Parallel Batch Systems: Constructive and Iterative Methods	QPA
June 13, 2008, 15.00-17.15 h., 20 & 27, 11.00-13.15 h., 2008, LG 1.105 LECTURE SERIES (I) by EURANDOM Chair David Brydges, University of British Columbia, Canada	GEN
June 13, 2008, 11.00-12.00 h., LG 1.105 (RSS) Olaf Wittich, Technische Universiteit Eindhoven Holonomic constraints and Brownian motion	RSS
June 10, 2008, 11.00 - 12.00, LG 1.105 Jeannette Janssen, Dalhousie University, Halifax, Nova Scotia, Canada. Modelling Self-organizing Networks With a Hidden Metric	RSS
June 10, 2008 13.30-14.30, LG 1.105 EPPS Anne Fey, EURANDOM Fractals in sandpiles	EPPS/ GEN
June 4, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
June 4, 2008, 10.30 - 11.00 h., LG 1.110 Robert Fitzner, TU Berlin. Superhedging under soft constrains in discrete-time market models and an introduction to a standard discrete time market model and the unconstrained pricing problem	RSS
June 3, 2008, 14.00-15.00 h., LG 1.105 Milan Bradonjic, UCLA, USA Combinatorial and Numerical Analysis of Geographical Threshold Graphs	RSS
June 3, 2008, 10.00 - 11.00 h., LG 1.105 Mladen Savov, University of Manchester, UK Small Time Behaviour of Lévy Processes. Laws of the Iterated Logarithm	QPA- MVR
May 29, 2008, 11.00-12.00 h., LG 1.105 Jean Mairesse, CNRS, Liafa, Paris	QPA
May 27, 2008, 14.00-15.00, LG 1.105 Ahmad Al Hanbali, University of Twente A Tandem Queueing Model for Delay Analysis in Disconnected Ad Hoc Networks	QPA
May 21, 2008, 14.00 - 16.30 h., LG 1.105 EURANDOM Tom Kevenaar - Chief Architect priv-ID Biometrics Classification Theory for Biometric Authentication	Phil/ GEN

May 20, 2008, LG 1.105 PUBLIC LECTURE by EURANDOM Chair David Brydges, University of British Columbia, Canada Would you rather be a field or a particle?	GEN
May 20, 2008, 11.00-12.00 h., LG 1.105 Urtzi Ayesta, CNRS (LAAS), France A unifying conservation law for single-server queues	QPA
May 16, 2008, 14.00-15.00 h., LG 1.105 Frank Redig, Leiden University Relaxation via concentration	RSS
May 16, 2008, 11.00-12.00 h., LG 1.05 Maria Deijfen, Stockholm University Random graphs with tunable degree distribution and clustering	RSS
May 14, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
April 25, 2008, 13.00-14.00 h., LG 1.10) Balint Virag, University of Toronto Large gaps between random eigenvalues	RSS
April 22, 2008, 11.15-12.15 h., LG 1.105 Zbigniew Palmowski, Mathematical Institute University of Wroclaw Cramér asymptotics for finite time first passage probabilities for general Lévy processes	QPA
April 22, 2008, 10.00 -11.00 h., LG 1.105 Reading Seminar QPA	QPA-Read-ing
April 16, 2008, 11.30-12.00 h., HG 8.61 Informal meeting Eindhoven statisticians	SIM
April 15, 2008, 14.00-17.30 h., LG 1.105 (QPA-MVR) Multivariate Risk Modelling Seminar (programme)	QPA-MVR
April 14, 2008, 13.30-14.30 h., LG 1.105 EPPS Ambedkar Dukkipati, EURANDOM On Algebraic descriptions of Maximum entropy models	EPPS/ GEN
April 11, 2008, 15.00-16.00 h., LG 1.105 Rob Waters, University of Bristol The duplicity of zero-one matrices	RSS
April 11, 2008, 12.15-13.15 h., LG 1.105 Phil Whiting, Bell Labs, Alcatel-Lucent Configurations in Regular and Irregular LDPC Code Ensembles	QPA
April 11, 2008, 11.00-12.00 h., LG 1.105 Lihu Xu, Hausdorff Research Institute for Mathematics, Bonn Some results on some interacting systems	RSS
April 10, 2008, 14.45-15.45 h., LG 1.105 (SIM) Rui M. Castro, Dept. of Electrical and Computer Engineering, Madison, USA Learning to Discover: Adaptive Data Selection for Classification and Estimation	SIM
April 8, 2008, (16.00 - 17.00) - LG 1.105 Pierre-Yves Louis, Universität Potsdam Perfect simulation & Complete monotone coupling for Markov processes	RSS
April 8, 2008, 10.00-11.00 h., LG 1.105 Brooke Shrader, University of Maryland A bulk-service queueing model for random network coding	QPA
April 4, 2008, 11.00-12.00 LG 1.105 Yoni Nazarathy, Haifa University The Asymptotic Variance Rate of the Output Process of Finite Capacity Queues	QPA
April 2, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM

March 27, 2008, 11.00-12.00 h., LG 1.105 EPPS Gugushvili, S, EURANDOM The blood coagulation: probabilistic approach to modelling and statistical analysis	EPPS/ GEN
March 19, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
March 12, 2008, 11.30-12.00 h., HG 6.05 Informal meeting Eindhoven statisticians	SIM
March 4, 2008, 11.00-12.00 h., LG 1.105 Milos Stojakovic, Univeristy Novi Sad Positional games on random graphs	RSS
February 28, 2008, 11.00-12.00 h., LG 1.105 EPPS Dimitris Cheliotis, EURANDOM Random matrices	EPPS/ GEN
February 27, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
February 14, 2008, 11.00-11.45 h., LG 1.105 Dr. Yahya Al-Harthi (King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia) Distributed Scheduling: A Look at Throughput and Stability in Random Access Networks	QPA
February 12, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
February 7, 2008, 14.00-15.00 H., LG 1.105 Vitali Wachtel, Technical University Munich Local probabilities for random walks conditioned to stay positive	QPA
February 5, 2008, 14.00 h - 15.45 h, LG 1.105 Yoav Kerner, EURANDOM Transient behavior of the customers in a loss system 15.00-15.45 h. Matthieu Jonckheere, TU/e Eindhoven Insensitive dynamic load balancing: new research directions	QPA
February 5, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
January 31, 2007, 14.00-16.00 h., EURANDOM Philips Series Sem Borst (Lucent, TUe, EURANDOM) Channel-aware scheduling and user mobility in wireless data networks Andreas Loepker (EURANDOM) The asymptotic behavior of the maximum process and the first passage time of Markovian growth collapse models Venue: Room Ernst, The Strip	Phil/ GEN
January 30, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
January 25, 2008, 11.00-12.00 h., LG 1.105 Dimitris Cheliotis, EURANDOM, Eindhoven. The noise of perturbed random walk on some regular graphs	RSS
January 24, 2008, 10.00-11.00 h., LG 1.105 Andreas Kyprianou (University of Bath, UK) Recent developments in the theory of scale functions for spectrally negative Lévy processes	QPA-MVR
January 24, 2008, 11.00-13.00 h., LG 1.105 Reading Seminar (RSS) on "Large Deviations"	RSS
January 23, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
January 22, 2008, 11.00-12.00h., LG 1.110 Federico Camia, Vrije Universiteit Amsterdam Mandelbrot's Fractal Percolation	RSS

January 22, 2008, 11.00-12.00 h., LG 1.105) Ana Busic, PRiSM, Université Versailles St Quentin Bounds on the order fill rates for an inventory system of service tools	QPA
January 18, 2008, 09.00-10.00 h., LG 1.105 Lionel Levine, University of California, Berkeley Internal Diffusion-Limited Erosion	RSS
January 17, 2008, 11.00-13.00 h., LG 1.105 postponed Reading Seminar (RSS) on "Large Deviations"	RSS
January 16, 2008, 11.30-12.00 h., HG 9.41 Informal meeting Eindhoven statisticians	SIM
January 9, 2008, 14.00-15.00 h., LG 1.105 Balakrishna Prabhu, EURANDOM On two problems related to performance analysis of communication networks	QPA
January 9, 2008, 11.00-12.00 h., LG 1.105 Guangming Pan, EURANDOM EPPS Limit theorems about sample mean, sample covariance matrix and T^2 statistic	EPPS/ GEN

EURANDOM Chair 2008

Professor David Brydges

David Brydges holds a Canada Research Chair at the Department of Mathematics at the University of British Columbia, Vancouver, Canada, where he works on the interplay between mathematical physics and probability theory. He is an expert in renormalization group methods, cluster and related expansion techniques, as well as Gaussian functional integration. Together with Tom Spencer, he originated the study of high-dimensional systems using the lace expansion. His work on functional integration and super symmetry, in particular for four-dimensional self-avoiding walks and branched polymers, is ground breaking. David's work is remarkably creative, and shows a deep understanding of the underlying physical principles of the problem.

David spent two months at EURANDOM between May 14 and July 12 2008.
He gave a Public Lecture "Would you rather be a field or a particle?"
"This will be an attempt to describe in an elementary way some of the structural aspects of quantum field theory (QFT), which I have always found to be very appealing, and yet not commonly known outside theoretical physics."
In particular,
1. What is the connection between QFT and the central limit theorem
2. Is QFT fundamental or is it the result of only being able to see the large scale structure of a microscopic world?
3. Why is QFT also a particle theory?
4. Does QFT exist in four dimensions and why is a Clay prize attached to this question?
5. what problems in probability theory and combinatorics are linked to QFT?
There will be integrals and integration by parts in topic (3)

He also gave a lecture series that covered the following topics:

1. Models and their representation in terms of Gaussian integrals
2. Hierarchical models and the action of the renormalisation group
3. Renormalisation group for models on the Euclidean lattice

6.3. EURANDOM visitors in 2008

2008	January	
B. Prabhakar (Stanford University, USA)	Jan. 13-15	QPA
D. Gamarnik (MIT, USA)	Jan. 13-15	QPA
A. Busic (PRiSM, Université Versailles St Quentin, F)	Jan. 21-25	QPA
A. Kyprianou (University of Bath, UK)	Jan. 24-25	QPA-MVR
	February	
U. Ayesta (CNRS, F)	Febr. 1- June 1	QPA
Y. Al-Harthi (King Fahd University of Petroleums and Minerals, Dahran SA)	Febr. 1-16	QPA
V. Wachtel (Technische Universität München, D)	Febr. 4-8	QPA
	March	
M. Stojakovic (University of Novi Sad, Yu)	March 1-9	RSS
	April	
P.Y. Louis (Universität Potsdam, D)	April 8-9	RSS
P. Whiting (Bell Labs, Alcatel-Lucent, USA)	April 11	QPA
Z. Palmowski (Wrocław University, P)	April 1-30	QPA
M. Slowik (WIAS, D)	April 4- May 5	RSS
B. Virag (University of Toronto, CA)	April 24-May1	RSS
	May	
D. Brydges (University of British Colombia, CA)	May 14- July 12	Chair
G. Slade (University of British Colombia, CA)	May 26-June 6	RSS
J. Mairesse (CNRS, FR)	May 28-30	QPA
	June	
M. Holmes (University of Auckland, NZ)	June 14-July 14	RSS
L. Chen (University of Auckland, NZ)	June 15-July 12	RSS
R. Kang (McGill, Montreal, CA)	June 26-30	RSS
	July	
S. Barlev (University of Haifa, IL)	July 24 - Oct. 24	QPA
G. Winkler (Ludwig-Maximilians Universität München, D)	July 6-11	SIM
P. Contucci (Università di Bologna, I)	July 18-28	RSS
A. Barra (Università di Roma "La Sapienza",I)	July 20-26	RSS
I. Gallo (Università di Bologna, I)	July 20-26	RSS
R. Burioni (Università degli Studi di Parma,I)	July 20-24	RSS

C. Giberti (Università di Modena e Reggio Emilia, I)	July 16-26	RSS
	August	
Z. Palmowski (Wrocław University, P)	August 1-31	QPA
O. Kella (Hebrew University of Jerusalem, IL)	August 17 - Sept. 7	QPA
D. Perry (University of Haifa, IL)	August 1-31	QPA
A. Sakai (Hokkaido University, Sapporo, JP)	August 1-31	RSS
	September	
T. Rolski (Wroclaw University, P)	Sept. 1-30	QPA
K. Sigman (Columbia University New York, USA)	Sept. 6 & 7	QPA
F. Guillemin (France Telecom R&D, FR)	Sept. 29 - Oct. 1	QPA
	November	
A. Gaudilliere, A. (Università degli Studi "Roma Tre", I)	November 8-11	RSS
F. Manzo (Università degli Studi Roma I, I)	November 8-11	RSS
E. Olivieri (Università degli Studi Roma I, I)	November 8-11	RSS
E. Scoppola (Università degli Studi "Roma Tre", I)	November 8-11	RSS
M. Birkner (WIAS, D)	November 20	RSS
	December	
B. Prabhu (CNRS-LAAS, FR)	Nov. 26 - Dec. 4	QPA
L. Mellor (Creative Capital Partners Limited, S)	December 1-3	QPA-MVR
S. Bhamidi (University of California Berkeley, USA)	December 1-21	RSS
D. Kim (Heriot-Watt University, UK)	December 9-12	QPA

In total 42 researchers visited EURANDOM in 2008 (from several days up to 3 months). Total residence time: 131 weeks.

Distribution over the programmes:

Programme	Number of visits	Weeks
QPA, incl MVR	20	76
RSS	20	43
SIM	1	0,5
General (Chair)	1	12
TOTAL	**42**	**131**

6. (INTER)NATIONAL COOPERATION and FUNDING

6.1. (Inter)national Cooperation

As the previous sections already show, international cooperation is flourishing through, amongst others, the workshops and the visitor programme. Many international organisations are supporting the activities of EURANDOM by sending their junior and senior researchers to attend a workshop or to spend some time as a visitor. Of course the main asset for internationalisation remains the fact that most of the junior researchers come from outside The Netherlands.

Through members of the scientific council and members of the steering committees, as well as via scientists who are active at EURANDOM and postdocs who left the institute, many contact lines continue to tie EURANDOM to mathematical institutes and universities all over the world.

EURANDOM is member of ERCOM, the European Research Centres on Mathematics, a committee under EMS (the European Mathematical Society), consisting of mathematical institutes that frequently host visitors and organize workshops. Together with EMS, ERCOM was able to realize a call for exploratory workshops, especially oriented towards mathematics institutes, by ESF for 2009 and 2010.

A new application was sent in for an RNP (Research Network Programme) on Probabilistic Analysis of Interacting Random Systems (PAIRS), chaired by professor Remco van der Hofstad.

Through several researchers at the Department of Mathematics and Computer Science of TU/e, EURANDOM also participated in the Network of Excellence Euro-NF "Anticipating the Network of the Future - From Theory to Design", which runs from January 1st, 2008 – December 31, 2010.

There is a close cooperation with German researchers through the Dutch-German Bilateral Research Group on "Mathematics of Random Spatial Models from Physics and Biology", which, after positive mid-term review, was granted a second period of three years. Although the German Schwerpunkt "Interagierende stochastische Systeme hoher Komplexität" has been ended, cooperation with German scientists continues, especially in the RSS programme.

Through one of the SIM senior fellows, links with the Universität Duisburg-Essen were established. Many young German researchers visited EURANDOM during the YES (Young European Statisticians) workshop and the preceding workshop Algorithms in Complex Systems.

6.2 Cooperation in The Netherlands

EURANDOM has formal agreements of cooperation with three national research schools in mathematics in The Netherlands: MRI (Mathematical Research Institute), EIDMA (the Euler Institute for Discrete Mathematics), and the Thomas Stieltjes Institute for Mathematics.

There are intensive links with the Department of Mathematics, the Department of Industrial Engineering and Innovation Sciences (formerly called Technology Management and)and the Department of Mechanical Engineering in Eindhoven through joint appointments, joint seminars, joint visitors, collaboration projects, etc. Some postdocs are involved in teaching activities at the Eindhoven University of Technology.

In 2008 EURANDOM continued tightening the network with alumni. Part of them attended the activities around the 10th anniversary of the institute, with a discussion, especially organized for and with them. Some of the alumni spoke at the workshop on the occasion of the anniversary and contributed to the special issue of Statistica Neerlandica, Volume 62, Issue 3, 2008.
Some alumni are still linked to EURANDOM via a research fellowship. This applies especially to some former postdocs, who found tenured positions at Dutch universities.

Also the senior fellows as well as joint appointments are ways of linking the institute to the other Dutch universities.

6.3. Funding

On the national level, basic financial support of EURANDOM is provided by Eindhoven University of Technology, through project funding by the general board of the University as well as by the Department of Mathematics and Computer Sciences, which provides services and manpower. NWO still provides, in competition with other organizations, project-oriented funding.
International funding was obtained, also mainly application / project based (MC fellow, contribution to workshops). Furthermore, EURANDOM is recognized by CNRS (Centre National de la Recherche Scientifique, the French National Science organisation) as a "Unité Mixte Internationale (UMI)". The expected flow of French researchers however is not well under way yet, because of the re-organisations in science organisations in France. However, reorganizations in CNRS seem to delay the flow of French researchers towards EURANDOM.

During the year 2008 28 junior researchers were (co-)financed by external funds (not all during the whole year). These funds came from NWO, the Netherlands Organization for Scientific Research, VIDI, VICI and Open Competition, including the BRICKS (Basic Research in Informatics for Creating the Knowledge Society) Programme, BRG, NET REFOUND, FALCON, EIB, The European Investment Bank, The European Commission, Marie Curie, Philips Electronics Nederland B.V., and in joint appointments with Philips on cable networks as well as with Philips and the Department of Chemistry of TU/e for the project on Batteries, and in joint appointments with the University of Amsterdam, CWI as well as with the Departments of Mathematics and Computer Science and of Technology Management, both at Eindhoven University of Technology.

The following organisations co-financed workshops: NWO, Stieltjes, University of Bologna, KNAW, TU/e Philips, Cohen Stichting, Gemeente Eindhoven, Volkswagen Stiftung, EIB, NDNS and cluster, MRI, furthermore there was funding out of a personal grant of a researcher at the Department of Mathematics and Computers Science of TU/e.

One long term visit was funded by an NWO-visitor grant.

7. FACILITIES

7.1. Computing

EURANDOM has ample computing facilities. Desktop equipment consists of personal computers that offer access to the Windows / NT and the Unix servers. The personal computers are connected through a high-speed network to these servers and to the internet. Service on UNIX machines comes from the Department of Mathematics and Computer Science. If needed, computing time can be bought on the supercomputing facilities of NCF. The mathematical software that is available consists of Mathematica, Maple, TEX, S-plus, Matlab, R, and programming languages such as C++, C and Visual Basic. Furthermore a wifi network and a small administrative procedure, arranged by the administrative staff, enables visitors to quickly connect their own laptops to the network.

7.2. Library

A modest in-house library is available. As with computing power and software, EURANDOM follows the policy to acquire books and journals only when they are frequently needed. EURANDOM has a working library, not a complete coverage of journals in the field of stochastics. Full-scale libraries are available for EURANDOM staff at Eindhoven University of Technology, especially at the Department of Mathematics, and access is given to the Dutch academic library system. Via the library of Eindhoven University of Technology EURANDOM researchers have the possibility to access among others J-STOR. In view of the fact that almost all journals can be found and read electronically, we decided to reduce the journal part of the library in favour of a limited broadening of the book library.

7.3. Housing

EURANDOM provides well-equipped office space, meeting rooms and seminar rooms, a common room, and lunch facilities for its staff in its own building. All other facilities of Eindhoven University of Technology may be used; this includes a sports centre on campus where people can participate in various kinds of sports as well as a day-care centre

8. EXPENDITURE

The sum of the expenditure is based on the audited financial report.

Expenditure (in K euro)

Staff	1012
Senior Fellows	63
Travel	37
Visitors	33
Workshops, Seminars	93
Books, Journals, Software	5
Depreciation costs	15
General costs	39
TOTAL	1297

Furthermore postdocs with a grant (206 K Euro), visitors (XX K Euro) and workshop participants (108 K Euro) with their own grants deliver an essential part of the EURANDOM activities. Based on average cost estimates this contribution "in natura" represented this year a money value of XXX K Euro.