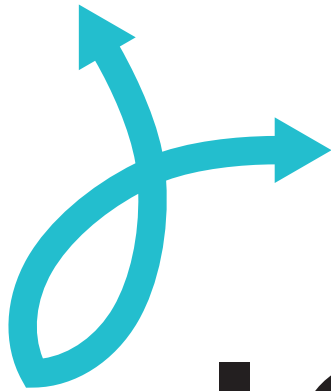


Annual Report, June 2008–December 2009

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ICE-TCS

Icelandic Centre of Excellence
in Theoretical Computer Science

1 Introduction

The Icelandic Centre of Excellence in Theoretical Computer Science (ICE-TCS) will celebrate its fifth birthday on 29 April 2010. This fourth annual report is meant to give the (Theoretical) Computer Science community in Iceland and elsewhere, our sponsors and funding agencies, and our scientific advisory board a bird's eye view of the activities of the Centre in the period June 2008–December 2009. (Future editions of the Centre's annual reports will cover its activities over calendar years.) It will also allow us to evaluate our achievements vis-a-vis our original aims in setting up this Centre, and to set ourselves goals for the future. In order to facilitate the evaluation of the Centre's research activities by the aforementioned parties, we append to the report a list of the publications by the members of the Centre since its inception. (See Appendix A.)

For the sake of completeness, we remind our readers that the aim of the Centre is to establish in Iceland important areas of basic research in the mathematical foundations of Computer Science, notably Algorithmic Program Verification, Mathematical Logic in Computer Science, Models and Logics for Reactive Systems, Semantics of Computation and Systems Biology, alongside existing activities in Algorithmics, Bioinformatics, Applied and Discrete Mathematics and Machine Learning.

ICE-TCS aims at exploiting the available scientific strength in order to

- focus the research efforts, and establish synergies amongst the active researchers in Iceland,
- attract outstanding researchers in Theoretical Computer Science to Iceland for short- or long-term visits leading to collaborations with local researchers and to improvements in the Icelandic research environment,
- organize international conferences and workshops in Theoretical Computer Science in Iceland to put the country firmly on the map as a recognized conference location for high quality events in the field, and
- attract young, outstanding students from Iceland to this research area.

The research centre was started as a collaboration between the Department of Computer Science, Faculty of Engineering, University of Iceland, and the School of Computer Science, Reykjavík University, and is still formally based at both institutions. However, basically all of the activities and the research carried out within the centre are presently taking place at the School of

Computer Science at Reykjavík University, to which most of permanent members of ICE-TCS are affiliated. This is a trend that has continued for the last two years and that we foresee will continue in the near future.

2 Executive summary and highlights for the reporting period

The reporting period has been the busiest one so far for the Centre. On the one hand, the members of the Centre organized ICALP 2008, the largest and most visible event in Computer Science ever organized in Iceland. On the other, we have striven to maintain a suitable level of activity in all of the core areas of business for the Centre. The Centre has also grown in size, both in terms of permanent members and with the hiring of postdoctoral researchers and doctoral students, and is by now one of the largest research centres in Iceland in any discipline and the largest in computer science and mathematics. In December 2009, ICE-TCS also graduated its first doctoral student, Elena Losievskaja, who was the first student ever to graduate with a PhD in Computer Science from an Icelandic institution.

During the reporting period, the Centre passed the 200-publication mark since its opening in April 2005, counting books, edited volumes, book chapters, journal papers and conference/workshop papers. This was a significant milestone for the Centre, but the impact of the research carried out within ICE-TCS must also be measured qualitatively. We hope to be in a position to carry out a research evaluation of the Centre at some point in the near future.

Events

ICALP 2008 and its affiliated events were held at Reykjavik University in the period 4–13 July 2008, with the main conference running in the period 7–11 July 2008. This edition of the conference broke all previous records. In response to the call for papers, the program committees received 472 submissions, the highest ever: 269 for track A, 122 for track B and 86 for track C. Out of these, 126 papers were selected for inclusion in the scientific program: 70 papers for track A, 32 for track B and 24 for track C. The selection was made by the program committees based on originality, quality, and relevance to Theoretical Computer Science. The quality of the manuscripts was very high indeed, and many deserving papers could not be selected. In addition, we received 16 workshop proposals, another record

number, out of which 13 were selected and 11 took place co-located with the main conference.

Apart from the contributed papers, ICALP 2008 featured five invited lectures and the presentation of two prestigious awards. The invited speakers for the conference were Ran Canetti (IBM T. J. Watson Research Center and MIT, USA), Bruno Courcelle (Labri, Université Bordeaux, France), Javier Esparza (Technische Universität München, Germany), S. Muthukrishnan (Google, USA) and Peter Winkler (Dartmouth, USA). The EATCS Award 2008 and the Gödel Prize 2008 were also awarded at the conference in a special ceremony that took place in the afternoon of July 10. The EATCS Award is given in recognition of a distinguished career in Theoretical Computer Science. The recipient of the 2008 EATCS Award was Leslie G. Valiant (Harvard, USA). The 2008 Gödel Prize for outstanding journal articles in the area of Theoretical Computer Science, co-sponsored by the EATCS and ACM SIGACT, was awarded to the paper *Smoothed analysis of algorithms: Why the simplex algorithm usually takes polynomial time* by Daniel A. Spielman and Shang-Hua Teng, *Journal of the ACM (JACM)*, 51(3), May 2004, 385–463. All the recipients of the above-mentioned awards attended the conference and delivered talks during the award session.

The list of special events at ICALP 2008 was completed by a special session devoted to a masterclass on mathematical puzzles for “kids of all ages”. The masterclass was given by Peter Winkler (Dartmouth, USA), who is the author of two famous books on mathematical puzzles and a noted expositor. Peter Winkler’s presentation was a resounding success. It was attended by well over 250 people and brought ICALP closer to the Icelandic general public. The Icelandic Maths Olympiad team attended the event and so did several mathematics high-school teachers. This was the first time ever that a special session of this kind was held as part of an ICALP conference. Based on its success, we recommend that future ICALP organizers consider holding similar events bringing ICALP closer to a general scientifically-minded audience.

One of the events that were co-located with ICALP was the 2nd Training School on Algorithmic Aspects of Dynamic Networks (DYNAMO 2008), which was attended by 50 young scientists.

A report on the ICALP conference is available in volume 96 of the Bulletin of the European Association for Theoretical Computer Science. Here we limit ourselves to quoting the following excerpt from that report:

ICALP was attended by 439 participants, including also 8 local organizers, together with DYNAMO by 489. This is the highest

number of all ICALP conferences so far.

As far as we know, ICALP 2009 did not break our record attendance.

The organization of international conferences and workshops plays a major role in the Centre's strategy to achieve a high level of international visibility. In the reporting period, Apart from ICALP 2008 and its co-located events, the following events were organized by ICE-TCS members in the reporting period:

- Marjan Sirjani co-chaired the *Third FSEN: IPM International Conference on Fundamentals of Software Engineering (FSEN09)*, 15-17 April 2009.
- Marjan Sirjani co-chaired of *8th International Workshop on the Foundations of Coordination Languages and Software Architectures FOCLASA'09*, a satellite workshop of the 36th International Colloquium on Automata, Languages and Programming (ICALP'09).
- Magnus Halldorsson (Reykjavik University) co-organized a special session on *Optimization and Approximation* in conjunction with CiE 2009: COMPUTABILITY IN EUROPE 2009 - Mathematical Theory and Computational Practice, Heidelberg, Germany, 19–24 July 2009.

The organization of international conferences and workshops in Iceland plays a major role in the Centre's strategy to achieve a high level of international visibility. In the reporting period, apart from ICALP 2008, we did not organize any such event in Iceland, but secured the organization of the 10th Nordic Combinatorial Conference (NORCOM 2010), which will be held at Reykjavik University in the period 26–28 May 2010, and of the edition for 2011 of the prestigious International Conference on Formal Power Series and Algebraic Combinatorics. Both these events will be organized by the very active Combinatorics Research Group within ICE-TCS. ICE-TCS also submitted a bid for hosting one of the future editions of CONCUR. However, our bid was unsuccessful.

In addition, ICE-TCS hosted its Theory Day for 2009 on Friday, 19 June 2009, at Reykjavik University. The programme for the event, which was attended by about 40 participants, included a keynote address by Zoltan Esik (University of Szeged, Hungary) and a talk by Paul van Tilburg (Eindhoven University of Technology, NL).

As in previous years, “regular” events, such as talks in our seminar series, have been advertised locally and on our ever-increasing mailing lists, which include well over 100 individuals at the time of writing, while events

appealing to a general audience have also been advertised in the local newspapers, and on the mailing lists of Reykjavik University as a whole, of the mathematics society and of the computer science society. In all cases, ICE-TCS events have been a large fraction (if not the majority) of advertised events. In fact, it is fair to say that the ICE-TCS Research Seminar series is the only regular seminar series in Computer Science in Iceland, and one of the very few seminar series in the country that have more than a handful of talks each year. During the reporting period, the ICE-TCS Research Seminar series hosted 46 seminars, not counting the talks delivered during the Theory Days.

Networking and Outreach

As already mentioned previously, one of the special events held as part of ICALP 2008 was Peter Winkler’s masterclass on mathematical puzzles for “kids of all ages”. Our aim in organizing this event was to generate further interest in Theoretical Computer Science and Discrete Mathematics in the general public within Iceland. The Icelandic Math Olympiad team attended the event. We remark that, via the combinatorics group and the participation of Bjarni V. Halldórsson, during 2008 and 2009 ICE-TCS has been heavily involved in training the Icelandic Math Olympiad team (for the annual international competition of high school students).

Some educational initiatives that we started during the reporting period were aimed at BSc. and MSc. students. In particular, ICE-TCS members were the prime movers in the design and running of a new *Problem Solving* course for first-year students in Computer Science, a new course on *Effective Programming and Problem Solving* for BSc. students and a course on *Logic in Computer Science* for third-year BSc. students and MSc. students. In addition, Magnús M. Halldórsson ran an MSc. course on *Distributed Algorithms* which was organized jointly with KTH Stockholm. The course sessions ran concurrently in Reykjavik and Stockholm and were held using video-conferencing facilities.

In order to try and arise interest in Theoretical Computer Science among our BSc. and beginning MSc. students, ICE-TCS members gave a series of introductory lectures on topics such as bisimulation, computer-aided verification and logic in computer science. These lectures were fairly well attended, and saw the participation of colleagues from research areas other than Theoretical Computer Science. We also continued our weekly reading group on graphs and algorithms. The reading group has seen the active participation

of MSc. students. However, at the time of writing, all the MSc. students who were previously affiliated with ICE-TCS have graduated and it seems that the present study body does not contain many theoretically-minded students. Attracting mathematically-minded students to computer science and retaining them remain difficult challenges, and it is fair to say that ICE-TCS has not been very successful at enticing BSc. and MSc. students so far.

ICE-TCS events have managed to attract a sizable attendance. Beyond members of the Centre, nearly every meeting is attended by some researcher from fields with areas of contact with theoretical computer science. We also host talks by researchers from sister-fields like mathematics and physics, with the aim to explore possible synergies between their work and the research carried out within the Centre. Of particular note here is the fruitful interplay between ICE-TCS and the Mathematics Institute at Reykjavík University. The members of the combinatorics group are, by any measure, amongst the most active contributors to ICE-TCS activities. Indeed, the growth of that group over the reporting period has been utterly remarkable. At the time of writing, the combinatorics group contributes five permanent members, four postdoctoral researchers and three PhD. students to ICE-TCS.

Despite the remote location of Iceland and the lack of funding, ICE-TCS continues to be fairly successful in attracting visitors to the Centre. As we detail in Tables 1 and 2, visits by short-term visitors have been spread relatively evenly over the course of the reporting period. (We had 30 guests in 2008, with an expected peak around the ICALP conference, and 24 in 2009.) However, we should like to increase the number of medium-term visitors and to begin a long-term visitor programme. This will require specific funding that is at the moment unavailable. However, ICE-TCS has been successful in attracting medium- and long-term visitors in 2010 using ad-hoc funding opportunities such as the Abel Extraordinary Chair programme run by Universidad Complutense de Madrid, Spain.

ICE-TCS participates in the network *COST295 - DYNAMO: Foundations and Algorithms for Dynamic Networks*. Magnús M. Halldórsson and his research associates represent the centre in this network.

ICE-TCS research has from the start involved students and other young researchers, but this still happens in modest amounts. During the reporting period, members of ICE-TCS have supervised 3 MSc. students in computer science, 2 MSc. students in mathematics, and five PhD. students. As mentioned previously, in December 2009, ICE-TCS graduated the first ever PhD. student in Computer Science in Iceland and we expect that two more

PhD. students will finish their theses in 2011. Moreover, one of the MSc. students who graduated in June 2009 took up a PhD. position at Chalmers University of Technology, Sweden. For these numbers to increase, the two main ingredients are student interest and funding. As we remarked earlier, we are finding it increasingly hard to attract students at BSc. and MSc. level. The likely demise of the BSc. programme in mathematics at Reykjavik University further reduces the appeal of our educational programmes at Reykjavik University for mathematically-minded students.

On the other hand, we are instead managing to attract a reasonable number of qualified applications for the PhD. positions we advertise internationally. We expect to have at least seven PhD. students in the autumn of 2010. (Compare with the three MSc. students ICE-TCS members supervise right now.)

As a possible way of attracting more theoretically-minded students to discrete mathematics and theoretical computer science, we have designed an “emphasis line” in theoretical computer science as part of the BSc. degree in computer science at Reykjavik University. Moreover, we are beginning the planning of a degree programme in Discrete Mathematics and (Theoretical) Computer Science at Reykjavik University. Only time will tell whether these efforts will allow us to achieve the educational impact we hope to have, and whether such a degree programme will see the light of day and survive in the difficult economic climate the Centre has been facing in Iceland since October 2008.

Research Highlights

The reporting period has seen the Centre pass the milestone of 200 peer-reviewed publications. At the time of writing, according to our records, ICE-TCS members have a total of 240 publications: one book, 15 edited volumes, five book chapters, 130 journal papers, 82 conference and workshop papers and seven abstracts in peer-reviewed ISI-indexed journals. Below, we limit ourselves to pointing out a few of highlights of the work carried out within the Centre in the reporting period.

- The paper *(2+2)-free posets, ascent sequences and pattern avoiding permutations* by Mireille Bousquet-Melou, Anders Claesson, Mark Dukes and Sergey Kitaev has been accepted for publication in the prestigious *Journal of Combinatorial Theory, Series A*. This paper has already had a substantial impact on research in the area and has sown the seeds for several other publications by members of the Combinatorics group within ICE-TCS.

- The paper *The Capacity of Arbitrary Wireless Networks* by Olga Goussevskaia (ETH Zurich, CH), Magnus Halldorsson (Reykjavik University), Roger Wattenhofer (ETH Zurich, CH) and Emo Welzl (ETH Zurich, CH) published in the Proceedings of INFOCOM 2009 is a prime example of Magnus Halldorsson's recent work on the algorithmic analysis of wireless networks.
- The paper *Multiple Genetic Loci for Bone Mineral Density and Fractures* by U. Styrkarsdottir, B.V. Halldorsson, S. Gretarsdottir, Gudbjartsson DF, et al., which appeared in the very prestigious *New England Journal of Medicine* 358(22):2355–2365, is paradigmatic of the work carried out by B. Halldórsson in the field of bioinformatics with researchers at deCODE Genetics. In that paper, the authors present their discovery of common sequence variants that are consistently associated with bone mineral density and with low-trauma fractures in three populations of European descent. Although these variants alone are not clinically useful in the prediction of risk to the individual person, they provide insight into the biochemical pathways underlying osteoporosis.
- The paper *Sysfier: Actor-based Formal Verification of SystemC* by N. Razavi, R. Behjati, H. Sabouri, E. Khamespanah, A. Shali, and M. Sirjani, to appear in the journal ACM Transactions on Embedded Computing Systems, provides an excellent example of the power of actor-based modelling and verification. This is an area of research in the field of computer-aided verification in which ICE-TCS has become active since the addition of Marjan Sirjani as a permanent member of the Centre.
- In January 2009, the paper *On the axiomatisability of priority* by Luca Aceto, Taolue Chen, Wan Fokkink and Anna Ingólfssdottir was amongst the top 10 most-read papers in the journal Mathematical Structures in Computer Science over the last 12 months.

In addition, it might be worth mentioning that the Department of Mathematics at the University of California, San Diego (UCSD) and the Mathematics Institute at Reykjavik University (Reykjavik University) have entered into an agreement on cooperation that will include exchanges of faculty and graduate students, joint research projects and publications and joint conferences and workshops. The primary contacts for the agreement are Einar Steingrímsson and Sergey Kitaev for RU and ICE-TCS and Jeffrey Remmel,

Professor of Mathematics and Associate Dean of the Division of Physical Sciences, for UCSD.

ICE-TCS was also the prime mover behind the establishment of an internship programme at the Fraunhofer USA Center for Experimental Software Engineering, University of Maryland, for the students in the Computer Science and Software Engineering programmes at Reykjavik University.

The impact of the Centre on the international research community may be reflected by invitations issued to its members to visit foreign institutions and to deliver addresses and courses abroad. Luca Aceto was visiting professor at the University of Camerino, Italy, in the period September–November 2008. There he delivered an MSc. course on *Modelling and Verification* and a mini-course on the life-cycle of scientific articles to doctoral students at the School of Advanced Studies. Sergey Kitaev was visiting professor at the University of California, San Diego (UCSD), and at the Sobolev Institute of Mathematics, Novosibirsk, Russia. During those visits, he wrote more than ten research papers and was invited to deliver several colloquium talks and research seminars.

Luca Aceto delivered an invited talk entitled *Characteristic Formulae for Fixed-Point Semantics: A General Framework* at the MogensFest (3–4 October 2009, Aarhus, Denmark). Yngvi Björnsson was a keynote speaker at CIG 2009, IEEE Symposium on Computational Intelligence and Games, Milan, Italy, 7–10 September 2009. Amy Glen (Reykjavik University) delivered an invited talk entitled *Abelian repetitions and crucial words* in a special session on Algebraic Combinatorics at the CMS/CSHPM Summer 2009 Meeting, Memorial University, St. Johns, Newfoundland (Canada). She also gave an invited talk entitled *Palindromic properties of infinite sequences with applications to Number Theory* in a special session on the interface between Number Theory and Dynamical Systems at the AMS Spring Central Sectional Meeting, University of Illinois at Urbana-Champaign, Illinois, USA. Magnus M. Halldorsson delivered an invited talk entitled *Word-representable graphs* at the RIMS Winter School on Graphs and Algorithms, Kyoto University, Japan, 15 December 2008. Joshua Sack delivered the Logic and Computation advanced course *Reasoning with Probabilities* at the 21st ESSLLI, Bordeaux, France. (The course was taught jointly with Eric Pacuit, Stanford University.) Einar Steingrímsson was the plenary invited speaker at *Permutation Patterns 2009, the seventh annual international conference on Permutation Patterns*, University of Firenze, Italy, 13–17 July, 2009.

ICE-TCS also contributed to the launch of *Electronic Proceedings in Theoretic Computer Science (EPTCS)*, a new international refereed open access venue for the rapid electronic publication of the proceedings of work-

shops and conferences, and of festschrifts, etc., in the general area of theoretical computer science, broadly construed. Luca Aceto is a member of the editorial board of EPTCS.

3 Current Members and Their Research Areas

ICE-TCS has now 14 permanent members (10 at Reykjavík University, three at the University of Iceland and one having a joint appointment between Reykjavík University and Université de Lyon 1). The present members of the Centre are: Luca Aceto (Reykjavík University, Scientific Co-director), Eyjolfur Ingi Ásgeirsson (Reykjavík University), Yngvi Björnsson (Reykjavík University), Anders Claesson (Reykjavík University), Mark Dukes (University of Iceland), Hjálmtýr Hafsteinsson (University of Iceland), Bjarni V. Halldórsson (Reykjavík University), Magnús M. Halldórsson (Reykjavík University, Scientific Director), Anna Ingólfssdóttir (Reykjavík University, Scientific Co-director), Sergey Kitaev (Reykjavík University), Sven Sigurdsson (University of Iceland), Marjan Sirjani (Reykjavík University), Einar Steingrímsson (Reykjavík University) and Luca Q. Zamboni (Reykjavík University and Université de Lyon 1).

In addition, the Centre hosts the following six postdoctoral researchers, who are all based at Reykjavík University: Vit Jelinek (combinatorics, graph theory), Martina Kubitzke (combinatorial commutative algebra), Pradipta Mitra (algorithmics, auctions), Robert Parviainen (combinatorics, probability theory), Joshua Sack (epistemic and modal logics) and Henning Ulfarsson (algebraic geometry and algebraic combinatorics).

During the reporting period, the Centre lost Silvio Capobianco (now extraordinary senior researcher at the Institute of Cybernetics, Tallinn University of Technology, Estonia), Amy Glen (now a lecturer at Murdoch University, Perth, Australia) and Anisse Kasraoui (now a postdoctoral researcher at the University of Vienna). All these former postdoctoral researchers maintain research connections with the Centre.

Starting from August 2010, the Centre will have six PhD. students (three in Computer Science and three in Mathematics). Five of those students are from outside Iceland.

With the current level of staffing and the upcoming hires, ICE-TCS has become one of the largest research centres in Iceland. With the present emphasis at Reykjavík University on building on existing areas of academic strength, we intend to lobby for future strategic hires in areas of interest to the Centre. In particular, we would like to hire staff members and/or post-

doctoral researchers in algorithmics, and to be in a position to offer medium- and long-term visiting research positions to researchers at different stages of their academic careers. Offering long-term visiting positions, however, will only be possible if specific Centre-building funding becomes available for this purpose.

At present, the members of ICE-TCS carry out research in the following main areas of Theoretical Computer Science and Discrete Mathematics: Algorithms and Complexity, Bioinformatics, Cellular Automata, Combinatorics, Computational Science, Computer-aided Verification, Concurrency Theory, Formal Methods in Software Engineering, Machine Learning, Search Methods in Artificial Intelligence and Structural Operational Semantics.

Research efforts in the algorithms group in the past year include minimizing interference in sensor networks, fixed-parameter algorithms for non-crossing spanning trees, minimum parsimony haplotyping on tractable subinstances, approximation algorithms for scheduling variants of graph coloring problems, and analysis of greedy algorithms for independent sets in hypergraphs.

One of the main directions of research conducted by the combinatorics group was the study of $(2+2)$ -free posets, which are equivalent to interval orders and are a widely studied object in the literature. In particular, a unique way of decomposing $(2+2)$ -free posets was discovered not only leading to several non-trivial enumerative results and connections to restricted permutations, upper triangular matrices, linearized chord diagrams, and certain sequences, but also to proving a conjecture of Pudwell on certain restricted permutations and a conjecture of Jovovic on certain upper triangular matrices.

The research efforts within the concurrency theory group have focussed on negative and positive results in the equational logic of process algebras, with emphasis on features like parallel composition, priority and real-time, on the meta-theory of structural operational semantics, with emphasis on rule formats for guaranteeing the validity of certain algebraic properties of processes, on the development of a general framework for the construction of characteristic formulae for processes with respect to behavioural semantics, and on computer-aided verification.

The software engineering group has focused on the further development of the theory and applications of the actor-based language Rebeca, and of its associated tool suite.

4 Funding

ICE-TCS continues to operate on what is a shoestring budget by international standards, and its activities are still supported by a variety of sources in what can only be defined as an ad-hoc way. As in previous years, nearly all the research visits to the Centre have been funded by our rather extensive network of Erasmus/Socrates exchange agreements or by the research funds of our guests. Some visitors have instead been supported by grant money secured by the Centre's researchers. The combinatorics group has instead been able to secure funding for guests from various sources both within Reykjavík University and from the Icelandic Ministry for Education.

Fortunately, ICE-TCS researchers continue to be fairly successful in obtaining grants from the Icelandic Research Fund (Rannsóknarsjóður). In the latest rounds of applications for projects starting in January 2009 and January 2010, members of ICE-TCS have obtained a good fraction of the grants awarded for projects in Engineering, Science and Technology. The new grants obtained, or applied for, in the reporting period are as follows:

- Arnar Birgisson received one of the six master-student grants awarded by the Icelandic Research Fund for Graduate Students for 2008. The grant was for 800K ISK.
- Einar Steingrímsson has been awarded an excellence grant for 24,600K ISK (theme: *Combinatorics of permutations and words*). This is the second excellence grant obtained by the combinatorics group since the inception of ICE-TCS.
- Magnús M. Halldórsson has been awarded a project grant (theme: *Algorithms for wireless networks*) for 3,110K ISK.
- Luca Aceto has been awarded a project grant for *Meta-Theory of Algebraic Process Theories* (three-year project; 6,660K ISK per year; Anna Ingólfssdóttir, co-proposer).
- Yngvi Björnsson has been awarded a project grant for *General Intelligence Problem-Solving Agents* (three-year project; 4,760K ISK per year).
- Anna Ingólfssdóttir has been awarded a project grant for *Processes and Modal Logics* (three-year project; 4,900K ISK per year; Luca Aceto, co-proposer).

This grant money has been topped up by a successful application to the Development Fund of Reykjavík University to support Joshua Sack for one year (roughly 4,000K ISK).

In addition, the following grants are still ongoing:

- Project grant awarded to Luca Aceto and Anna Ingólfssdóttir for a three-year project on *New Developments in Operational Semantics*;
- Project grant awarded to Yngvi Björnsson for a three-year project on *General Game Playing*; and
- PhD. grant awarded to Einar Steingrímsson for work in algebraic combinatorics.

We remark that these grants, however, can only be used to support project specific activities, and *not* for activities related to the Centre as such. Whatever success ICE-TCS might have had so far has therefore been achieved with minimal financial support. We believe that the quantity and quality of the Centre’s activities, and its impact on research and education in computer science in Iceland, could be increased substantially if ICE-TCS had more funding.

ICE-TCS researchers have been lobbying for the development of specific funding sources for Centres of Excellence for some time. In 2008, Rannis made some funding for this purpose available and issued a call for “pre-proposals” for such centres. ICE-TCS was instrumental in the organization of a consortium building on its strength and in the submission of a pre-proposal. That pre-proposal was, however, not selected for further consideration.

5 Activities for the Period June 2008–December 2009

5.1 Guests

During the reporting period, we have received 54 guests from foreign institutions for short stays. These are listed in Tables 1 and 2 in reverse chronological order. All of the guests delivered seminars and/or contributed (mini-)courses organized by the Centre.

Wolfgang Merkle (Ruprecht-Karls-Universität Heidelberg, Germany). Period: 4–12 September, 2008.

Giuseppe Persiano (Università di Salerno, Italy). Period: 6–13 July, 2008.

Ashish Goel (Stanford University, USA). Period: 6–13 July, 2008.

Roger Wattenhofer (ETH Zürich, Switzerland). Period: 6–13 July, 2008.

Joseph Sifakis (Verimag, France). Period: 6–13 July, 2008.

Vincent Danos (University of Edinburgh, UK). Period: 6–13 July, 2008.

Andreas Winter (University of Bristol, UK). Period: 6–13 July, 2008.

Terry Rudolph (Imperial College, UK). Period: 6–13 July, 2008.

Christina Fragouli (École Polytechnique Fédérale de Lausanne, CH). Period: 6–13 July, 2008.

Catuscia Palamidessi (INRIA Futurs Saclay and LIX, École Polytechnique, France). Period: 6–13 July, 2008.

Susanne Albers (Freiburg University, Germany). Period: 6–13 July, 2008.

Philippe Robert (INRIA Roquencourt, France). Period: 6–13 July, 2008.

Fedor Fomin (University of Bergen, Norway). Period: 6–13 July, 2008.

Shlomi Dolev (Ben-Gurion University of the Negev, Israel). Period: 6–13 July, 2008.

Christian Scheideler (Technische Universität München, Germany). Period: 6–13 July, 2008.

Elias Koutsoupias (University of Athens, Greece). Period: 6–13 July, 2008.

Al Roth (Harvard University, USA). Period: 6–13 July, 2008.

Kurt Mehlhorn (Max Planck Institut fuer Informatik, Germany). Period: 6–13 July, 2008.

Helmut Schwichtenberg (University of Munich, Germany). Period: 6–13 July, 2008.

Stephane Legrand (LIX Ecole Polytechnique, France). Period: 6–13 July, 2008.

Ran Canetti (IBM T.J. Watson Research Center and MIT, USA). Period: 6–13 July, 2008.

Bruno Courcelle (Labri, Université Bordeaux, France). Period: 6–13 July, 2008.

Javier Esparza (Technische Universität München, Germany). Period: 6–13 July, 2008.

Muthu Muthukrishnan (Google, USA). Period: 6–13 July, 2008.

Peter Winkler (Dartmouth, USA). Period: 6–13 July, 2008.

Clifford Stein (IEOR and Department of Computer Science, Columbia University, USA). Period: 30 June–3 July, 2008.

Bridget Eileen Tenner (Department of Mathematical Sciences, DePaul University, USA). Period: 27 June–31 July, 2008.

Jeff Remmel (Department of Mathematics, University of California at San Diego, USA). Period: 16–23 June, 2008.

Tommaso Toﬀoli (Electrical and Computer Engineering Department, Boston University, USA). Period: 15 June–20 June, 2008.

Eirikur Palsson (Dept. of Biology, Simon Fraser University, Canada). Period: 6 June, 2008.

Table 1: ICE-TCS Guests in the Period June 2008–December 2008

Hadas Shachnai (Technion, Haifa, Israel). Period: 3–10 December, 2009.

Mario Szegedy (Rutgers University, NJ, USA). Period: 30 November–5 December, 2009.

Paul Blain Levy (School of Computer Science, University of Birmingham, UK). Period: 16–22 November, 2009.

Włodzimierz Moczurad (Faculty of Computer Science, Nowy Sacz School of Business and Institute of Computer Science, Jagiellonian University, Poland). Period: 16–21 November, 2009.

Bjarki Holm (University of Cambridge, UK). Period: 13 November, 2009.

Claus Brabrand (IT University, Copenhagen, Denmark). Period: 21–22 September, 2009.

Ymir Vigfusson (Department of Computer Science, Cornell University, USA). Period: 14–21 September, 2009.

Einar Broch Johnsen (University of Oslo, Norway). Period: 24–30 August, 2009.

Marcel Kyas (Freie Universitaet Berlin, Germany). Period: 21 August, 2009.

Frank de Boer (CWI and Universiteit Utrecht, The Netherlands). Period: 17–21 August, 2009.

Pall Melsted (Carnegie Mellon University, USA). Period: 14 August, 2009.

Bridget Eileen Tenner (Department of Mathematical Sciences, DePaul University, USA). Period: 12–31 August, 2009.

Eva Jelinkova (Charles University, Prague, Czech Republic). Period: Academic year 2009–2010.

Fumei Lam (UC Davis, USA). Period: Early July, 2009.

Eric Babson (University of California, Davis, USA). Period: 26 June–7 July, 2009.

Zoltan Esik (University of Szeged, Hungary, and Universitat Rovira i Virgili, Tarragona, Spain). Period: 18–25 June, 2009.

Paul van Tilburg (Eindhoven University of Technology, NL). Period: 8–25 June, 2009.

Francois Laroussinie (University of Paris VII, France). Period: 1–7 June, 2009.

Rosario Culmone (University of Camerino, Italy). Period: 28–29 May, 2009.

Emanuela Merelli (University of Camerino, Italy). Period: 28–29 May, 2009.

Martina Kubitzke (Philipps-Universität, Germany) Period: 18–25 May, 2009.

Marco Bernardo (University of Urbino, Italy). Period: 18–22 May, 2009.

Rance Cleaveland (Department of Computer Science, University of Maryland College Park, USA) visits ICE-TCS. Period: 14–15 May, 2009.

MohammadReza Mousavi (Eindhoven University of Technology, The Netherlands). Period: 23–26 February, 2009.

Table 2: ICE-TCS Guests in 2009

5.2 Organization of Conferences, Symposia and Workshops

Members of the Centre have served as organizers and PC members for the following events.

- Luca Aceto, Magnús M. Halldórsson and Anna Ingólfssdóttir. Conference chairs, International Conference on Automata, Languages and Programming (ICALP) '08
- Luca Aceto. The 35th International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2009), Czech Republic. (PC member for the Foundations of Computer Science track)
- Luca Aceto. Third FSEN: IPM International Conference on Fundamentals of Software Engineering (FSEN09), Iran, April 15-17 2009. (PC member)
- Luca Aceto. Structural Operational Semantics 2009, 31 August 2009, Bologna, Italy. (PC member)
- Luca Aceto. 20th International Conference on Concurrency Theory (CONCUR 09), 1-4 September 2009, Bologna, Italy. (PC member)
- Luca Aceto. Third Conference on Algebra and Coalgebra in Computer Science (CALCO 2009), Udine, Italy, 7-10 September 2009. (PC member)
- Luca Aceto and Anna Ingólfssdóttir. 21st Nordic Workshop on Programming Theory (NWPT'09), Lyngby, Denmark, 14-16 October 2009. (PC member)
- Luca Aceto. International Conference on Formal Engineering Methods (ICFEM 09), Rio de Janeiro, December 9-12, 2009. (PC member)
- Magnús M. Halldórsson. Member of Organizing Committee, Matching Under Preferences (MatchUP): Algorithms and Complexity, Satellite workshop of ICALP 2008.
- Magnús M. Halldórsson. Member of Programming Committee, 4th International Workshop on Algorithmic Aspects of Wireless Sensor Networks (AlgoSensors 2008), Satellite workshop of ICALP 2008.
- Magnús M. Halldórsson. Member of Programming Committee, Int'l Conference on Distributed Computing and Networking (ICDCN) 2009 (PC member)

- Magnús M. Halldórsson. Member of Program Committee, APPROX 2009.
- Marjan Sirjani. Member of Program Committee, ICTAC 2009.
- Marjan Sirjani. Member of Program Committee, FACS 2009.
- Marjan Sirjani. Member of Program Committee, FM 2009.
- Marjan Sirjani. Co-Chair of Program Committee, FOCLASA 2009.
- Marjan Sirjani. Co-Chair of Program Committee, FSEN 2009.
- Einar Steingrímsson. Member, Program Committee Formal Power Series and Algebraic Combinatorics 2008.

5.3 Service and Honours

Members of ICE-TCS participate in the life of the international research community in Theoretical Computer Science at large. For instance, they hold positions in the steering committee of conferences and professional organizations, and act as (guest) editors of volumes and international journals. A sample of service activities contributed by members of the Centre can be found in Table 3.

5.4 ICE-TCS Seminar Series

One of the main aims of ICE-TCS is to foster a broad appreciation of the field of Theoretical Computer Science in Iceland, and to help improve the Icelandic research environment in Computer Science at large. To this end, during its third year of existence, the Centre has organized the following seminar series:

- Research Seminar Series, and
- Reading groups.

These two seminar series are supposed to cater for different types of audiences and of presentations. As its name suggests, the *Research Seminars Series* is used for technical presentations reporting on research that has reached a fairly complete stage of development. Overall, there have been 46 seminars in this series during the reporting period. (See <http://www.icetcs.ru.is/rsem.html> for details on these talks.)

Membership and Steering of Learned Bodies

- TC1 Working Group 1.8 on Concurrency Theory, of the International Federation for Information Processing (IFIP). (Luca Aceto (chair) and Anna Ingólfssdóttir (secretary))
- Luca Aceto has been a member of the Scientific Advisory Board of BICI (Bertinoro International Center for Informatics) until December 2009.
- Luca Aceto has been re-elected as a member of the EATCS council.
- Luca Aceto is the chairman of the Publication Committee of the EATCS.
- Luca Aceto is a member of the ICALP Liaison Committee of the EATCS.
- Magnús M. Halldórsson is a member of the steering committee for the Scandinavian Workshop on Algorithm Theory series. He is chair of that committee since March 2007.
- Einar Steingrímsson is a member of the newly formed permanent steering committee for the Nordic Combinatorial Conference.

Membership of Editorial Boards

- Concurrency Column of the Bulletin of the European Association for Theoretical Computer Science (EATCS). (Luca Aceto editor)
- Journal of Logic and Algebraic Programming, Elsevier. (Luca Aceto editor and Anna Ingólfssdóttir guest editor)
- Acta Cybernetica (a scientific journal published by the Department of Informatics of the University of Szeged, Szeged, Hungary). (Luca Aceto editor)
- *Electronic Proceedings in Theoretic Computer Science (EPTCS)*. (Luca Aceto editor)
- Mathematical Structures in Computer Science, Cambridge University Press. (Luca Aceto and Anna Ingólfssdóttir guest editors)
- Discrete Mathematics and Theoretical Computer Science. (Magnús M. Halldórsson managing editor)
- Annals of Combinatorics. (Einar Steingrímsson guest editor)

Table 3: Service and Honours by Members of ICE-TCS

Reading groups are used by ICE-TCS to learn about topics that have the potential of creating synergies amongst the members of the Centre, or as fora for the discussion of research in one of the core areas of the Centre. As examples of the latter use of a reading group, we initiated a series of meetings on *Graphs and Algorithms*. This reading group initially involved MSc. students in order to get them interested in those topics and to provide them with some of the necessary background for working on an MSc. thesis in those areas. At the time of writing, however, all the students who were involved in the reading group have graduated and the meetings of the group are attended only by permanent members and postdoctoral researchers. We hope that this will change in the near future.

5.5 Courses and Students

As far as impact on the Icelandic Computer Science community is concerned, one of the main aims of ICE-TCS has always been to attract students to Theoretical Computer Science. Teaching, in the broad sense, plays a very important role in achieving this aim, and the members of ICE-TCS engage in course development and in student supervision. Apart from our dissemination activities related to the seminar series and the reading groups, ICE-TCS researchers have delivered classic courses on *Algorithmics* and *Theory of Computation*, at various levels, and new courses on *Bioinformatics*, *Distributed Algorithms*, *Graph Theory*, *Logic in Computer Science*, *Modelling and Verification*, *Problem Solving* and on *Semantics of Programming Languages* at Reykjavík University. A new course on *Effective Programming and Problem Solving* will be delivered in the spring semester 2010.

Members of the Centre have supervised the following MSc and PhD students.

- Unnar Thor Bachmann (Reykjavík University), MSc student working on his thesis supervised by Magnús M. Halldórsson. (Graduation date: December 2009)
- Pawel Bartoszek (Reykjavík University), PhD student supervised by Einar Steingrímsson.
- Arnar Birgisson (Reykjavík University), MSc student working on his thesis supervised by Luca Aceto. (Graduation date: June 2009. Presently PhD student at Chalmers University of Technology, Sweden)

- Bergsteinn Einarsson (Reykjavík University), MSc student (Algebraic Combinatorics) working on his thesis supervised by Anders Claesson and Einar Steingrímsson.
- Matteo Cimini (Reykjavík University), PhD student working on his thesis supervised by Luca Aceto and Anna Ingólfssdóttir.
- Vigdis Gudjonsdóttir (Reykjavík University), MSc student working on his thesis supervised by Anna Ingólfssdóttir.
- Hilmar Haukur Gudmundsson (Reykjavík University), MSc student (Algebraic Combinatorics) supervised by Sergey Kitaev and Einar Steingrímsson.
- Marteinn Hardarson (Reykjavík University), MSc student (Algebraic Combinatorics) supervised by Anders Claesson and Einar Steingrímsson.
- Elena Losievskaja (Reykjavík University), PhD student supervised by Magnús M. Halldórsson. (Graduation date: December 2009. Present employment: Icelandic Heart Association.)
- Steve Widmer (Reykjavík University), PhD student supervised by Luca Q. Zamboni and Amy Glen.

6 Publications by Members of the Centre

We already mentioned some of the research highlights earlier in this report. Here we limit ourselves to mentioning that the work carried out by the members of our research groups in algorithmics and combinatorics has been presented at some of the premiere conferences in those areas such as ICALP, SODA, SWAT and FPSAC and in some of the top journals, such as Journal of Combinatorial Theory, Series A. Yngvi Björnsson's work on search-methods in artificial intelligence is having high visibility both nationally and internationally. Apart from being published in the top publication outlets in the area, some of that work has achieved wide recognition. Finally, ICE-TCS was well represented at TCS 2008 and FSEN 2009 (two papers at each event).

Overall, the members of ICE-TCS have so far published one book, 15 edited volumes, five book chapters, 130 journal papers, 82 conference and workshop papers and seven abstracts in peer-reviewed ISI-indexed journals.

Full details on the publications by members of the Centre since its inception may be found in Appendix A.

7 Forthcoming Activities

During 2010, we plan to continue our work with the aim of achieving the objectives stated in Section 1.

We intend to continue expanding our visitors programme. In particular, we hope to be in a position to offer a small number of medium- to long-term visiting positions to selected researchers. Four of these visits will be supported by the Abel Extraordinary Chair programme. Moreover, we have applied to the Development Fund of Reykjavik University for funding for two visiting professors for one month. The following visits, listed in reverse chronological order, have been confirmed, or have already taken place at the time of writing:

- Ignacio Fabregas Alfaro (Universidad Complutense Madrid, Spain). Period: 7 September–6 October, 2010. Abel extraordinary predoc.
- Miguel Palomino (Universidad Complutense Madrid, Spain). Period: 7 September–6 October, 2010. Abel extraordinary postdoc.
- David de Frutos Escrig (Universidad Complutense Madrid, Spain). Period: 5 April–5 July, 2010. Abel extraordinary professor.
- Carlos Gregorio Rodriguez (Universidad Complutense Madrid, Spain). Period: 5 April–5 July, 2010. Abel extraordinary postdoc.
- Andrei Sabelfeld (Chalmers University of Technology, Sweden). Period: 26 March, 2010.
- Bas Luttik, Department of Mathematics and Computer Science, Eindhoven University of Technology, The Netherlands. Period: 8-12 March, 2010.
- Mads Dam (Theoretical Computer Science, School of Computer Science and Communication, Royal Institute of Technology (KTH), Stockholm, Sweden). Period: 12 January, 2010.

We expect that a few more guests will visit ICE-TCS during 2010, despite the lack of funding at our disposal to support their travel.

The international connections of the Centre will also be strengthened by

- a two-month Velux Visiting Research Professorship at the Technical University of Denmark awarded to Anna Ingólfssdóttir to work with Flemming Nielson and Hanne Riis Nielson (15 April–15 June 2010);
- a six-month Abel Extraordinary Chair awarded to Sergey Kitaev to work with Marc Noy at Universitat Politècnica de Catalunya, Spain; and
- a two-month Abel Extraordinary Chair awarded to Luca Aceto to work with David de Frutos Escrig and his research group at Universidad Complutense de Madrid, Spain.

The ICE-TCS Theory Day for 2010 will take place on Friday, 30 April 2010. The event will also mark the fifth birthday of the Centre and will give us an opportunity to celebrate whatever achievements the Centre might have had so far as well as to look at its future developments. The 10th Nordic Combinatorial Conference (NORCOM 2010) will be held at Reykjavik University (with invited talks by Magnus M. Halldórsson and Luca Q. Zamboni) in the period 26–28 May 2010. In addition, on 19–20 June 2010, Magnús M. Halldórsson will organize the *Workshop on Realistic Models for Algorithms in Wireless Networks* as an affiliated event of SWAT 2010, which will be held in Bergen, Norway. If funds become available, we also intend to organize one or two informal workshops at Reykjavik University with invited speakers from abroad. The tentative topics for the workshops are “Algebraic theories of processes and structural operational semantics” and “Processes and modal logics”.

Our plans to increase the outreach activities of the Centres have only partly materialized. The masterclass by Peter Winkler has been the last event of this kind organized by ICE-TCS. We expected to be in a position to organize one or two public lectures by high-profile scientists, but we have been unable to turn these plans into reality. We hope to be in a position to host at least one public lecture in 2010.

On 5 February 2010, Magnús M. Halldórsson, the scientific director of ICE-TCS, was the recipient of the first Reykjavik University Research Award. This award recognizes his distinguished research career in theoretical computer science and discrete mathematics.

At the time of writing, it is becoming apparent that ICE-TCS will have a good degree of international visibility during 2011. For instance,

- Magnús M. Halldórsson will chair the PC for ESA 2011,
- Luca Aceto will chair the PC for ICALP 2011 (track B) and

- FPSAC 2011 will be held at Reykjavik University.

Finally, we think that it will soon be useful for the Centre to undergo an evaluation by a top-class panel of experienced researchers. This evaluation will be used by the Centre to obtain an objective evaluation of its achievements so far in relation to the available resources, as well as useful feedback for improving its activities and impact in the future.

8 Summary and Self-Evaluation

The reporting period has seen the Centre substantially expand its membership, efforts and activities, increase its research output, and achieve some level of recognition in the international research environment. The hosting of ICALP 2008 and its 11 affiliated events has helped establish ICE-TCS as a known research centre in the TCS community at large, and the planned future events in combinatorial mathematics organized by the members of the Centre in 2010 and 2011 will further increase the visibility of our already very active combinatorics group.

During the reporting period, the Centre has also increased and diversified its educational activities. Moreover, the combinatorics group within ICE-TCS is becoming known for offering high-quality education in (discrete) mathematics from students from age 12 till 18, and for training the Icelandic Math Olympiad team. We feel that these activities are important for the future of TCS and Discrete Mathematics in Iceland, as well as for the visibility of the Centre within Iceland. It is, however, fair to say that ICE-TCS has so far achieved a larger exposure in the international research community than in Iceland itself, at least amongst students and scientists. This is despite the level of research activity of the Centre, the events (such as conferences and workshops, the ICE-TCS seminar series and the yearly editions of the Theory Day) that it organizes, its success in attracting visitors to Iceland and in securing grants from the Icelandic Fund for Research, and its ability to attract qualified doctoral students to Reykjavik University. The Centre will have to decide whether its still limited level of national recognition is a concern and, if so, what should be done to combat this trend. Perhaps related to this issue is the very small number of BSc. and MSc. students that undertake research work with the members of the Centre. We trust that the planned new study line in Discrete Mathematics and (Theoretical) Computer Science at Reykjavik University may help us groom future generations of students with a mathematical mindset.

We are very satisfied with the number of short-term visitors we have had during the reporting period. All the visitors contributed seminars to the lively ICE-TCS seminar series during their stays, and some of the visits led to joint research and publications. However, we would like to increase the number of medium- and long-term visitors to the Centre. In particular, we believe that ICE-TCS and the overall Icelandic research environment in (theoretical) computer science and mathematics would benefit if we were able to offer even a small number of visiting positions ranging from one to six months, say, to researchers at different stages of their career.

During the reporting period, we have seen a welcome increase in the number of postdoctoral and PhD positions within the Centre. This has been made possible by the successful grant applications of several members of ICE-TCS. Maintaining this number of postdocs and PhD students, and possibly increasing it to about twenty overall, would be very beneficial for creating a research environment in TCS and discrete mathematics that would put Iceland firmly on the map as a centre for high-quality research in (some of) the areas covered by ICE-TCS. To our mind, such a level of activity and staffing can only be achieved if the Centre secures centre-of-excellence funding for a period of about five years. Whether such funding will become available is, at best, doubtful. It is much more likely that ICE-TCS will continue operating on a shoestring budget, doing most of the things it already does, but perhaps on a smaller scale.

On an administrative note, ICE-TCS has now reached a size and a level of activity that it may need to appoint a secretary and a web master. So far, all the secretarial and web-management work has been carried out by a handful of members of the Centre. It is now very clear that this administrative model is not sustainable and that a more professional approach is needed.

Overall, we feel that the Centre is well on the way to achieve the level of international impact and recognition in theory and computer science that was envisioned with its founding in April 2005. However, we feel that we would be able to achieve more if more funding were available for the Centre. Much remains to be done in order to promote discrete mathematics, theory and computer science amongst the local student population and the Icelandic scientific environment at large. We look forward to the challenges ahead and to what the future will bring.

Further information is available from the Centre's web page at:

<http://www.icetcs.ru.is>.

A List of ICE-TCS Publications 2005–to date

Books

1. L. Aceto, A. Ingólfssdóttir, Kim G. Larsen and J. Srba. *Reactive Systems: Modelling, Specification and Verification*, Cambridge University Press, August 2007. ISBN-13: 9780521875462.

Edited Volumes

1. L. Aceto, J. Baeten, W. Fokkink, A. Ingólfssdóttir and U. Nestmann. *Special Issue: IFIP WG1.8 Workshop on Applying Concurrency Research in Industry*. *Journal of Logic and Algebraic Programming* 78(4):191–288, April 2009.
2. L. Aceto, M. Bravetti, W. Fokkink and A.D. Gordon. *Special Issue: Algebraic Process Calculi (The First Twenty Five Years and Beyond)*. *Journal of Logic and Algebraic Programming* 70(2):119–238, February 2007.
3. L. Aceto, M. Bravetti, W. Fokkink and A.D. Gordon. *Special Issue: Algebraic Process Calculi (The First Twenty Five Years and Beyond): Volume 2*. *Journal of Logic and Algebraic Programming* 72(1):1–122, May-June 2007.
4. L. Aceto, M. Bravetti, W. Fokkink and A.D. Gordon. *Special Issue: Algebraic Process Calculi (The First Twenty Five Years and Beyond): Volume 3*. *Journal of Logic and Algebraic Programming* 75(1):1–166 (February-March 2008).
5. L. Aceto, I. Damgård, L.A. Goldberg, M.M. Halldórsson, A. Ingólfssdóttir and I. Walukiewicz. *Automata, Languages and Programming, 35th International Colloquium, ICALP 2008, Reykjavik, Iceland, July 7–11, 2008, Proceedings, Parts I and II*. *Lecture Notes in Computer Science* volumes 5125 and 5126, Springer-Verlag, July 2008.
6. L. Aceto, Z. Ésik, W. J. Fokkink and A. Ingólfssdóttir. *Special issue of Theoretical Computer Science devoted to selected papers from Process Algebra: Open Problems and Future Directions* (July 21–25, 2003, University of Bologna Residential Center, Bertinoro (Forlì), Italy), volume 335(2–3):127–406, 23 May 2005.

7. L. Aceto and A.D. Gordon. *Essays on Algebraic Process Calculi*. Electronic Notes in Theoretical Computer Science 162, pp. 1–340, Elsevier, 29 September 2006.
8. L. Aceto and A. Ingólfssdóttir. *Foundations of Software Science and Computation Structures: 9th International Conference, FOSSACS 2006, Held as Part of the Joint European Conferences on Theory and Practice of Software, ETAPS 2006, Vienna, Austria, March 25–31, 2006. Proceedings*, Lecture Notes in Computer Science 3921, Springer-Verlag, March 2006. ISBN: 3-540-33045-3.
9. L. Aceto and A. Ingólfssdóttir. *Foundations of Software Science and Computation Structures: 9th International Conference, FOSSACS 2006: Special Issue*. Journal of Logic and Algebraic Programming 73(1–2): 1–146, September-October 2007.
10. L. Aceto and A. Ingólfssdóttir. *Special Issue: Eighteenth Nordic Workshop on Programming Theory 2006*. Journal of Logic and Algebraic Programming 77(1–2):1–156 (September-October 2008).
11. L. Aceto and A. Ingólfssdóttir. *Special Issue in memory of Nadia Busi of Mathematical Structures in Computer Science*, volume 19(6), pp. 1061–1287, Cambridge University Press, 4 December 2009.
Available at <http://journals.cambridge.org/action/displayIssue?jid=MSC&volumeId=19&issueId=06&iid=6798412>.
12. F. Arbab and M. Sirjani. *Fundamentals of Software Engineering, Third IPM International Conference, FSEN 2009, Kish Island, Iran, April 15–17, 2009*, Lecture Notes in Computer Science 5961, 2010.
13. H. Jaap van den Herik, Yngvi Björnsson and Nathan S. Netanyahu. *Computers and Games, Forth International Conference, CG 2004, Ramat-Gan, Israel, July 5-7, 2004, Revised Papers*. Lecture Notes in Computer Science 3846, Springer-Verlag, 2006.
14. Anna Ingólfssdóttir, Bud Mishra, Hanne Riis Nielson, and Corrado Priami. *Transactions on Computational Systems Biology VII*, Springer 2006.
15. Einar Steingrímsson. *Annals of Combinatorics*, special issue devoted to selected papers from Permutation Patterns 2006, December 2007.

Chapters in Books and Collections

1. L. Aceto, J. Baeten, W. Fokkink, A. Ingólfssdóttir and U. Nestmann. Applying Concurrency Research in Industry: Report on a Strategic Workshop. *Bulletin of the European Association for Theoretical Computer Science* 94:113–129, February 2008.
2. L. Aceto and W. Fokkink. The Quest for Equational Axiomatizations of Parallel Composition: Status and Open Problems, in *Essays on Algebraic Process Calculi* (L. Aceto and A.D. Gordon eds.), *Electronic Notes in Theoretical Computer Science* 162:43–48, Elsevier, 29 September 2006.
3. L. Aceto, W. J. Fokkink, A. Ingólfssdóttir, and B. Luttik. Finite Equational Bases in Process Algebra: Results and Open Questions. *Processes, Terms and Cycles: Steps on the Road to Infinity: Essays Dedicated to Jan Willem Klop on the Occasion of His 60th Birthday* (Aart Middeldorp, Vincent van Oostrom, Femke Raamsdonk, and Roel de Vrijer editors), *Lecture Notes in Computer Science* 3838, pp. 338–367, Springer-Verlag, December 2005. ISBN: 3-540-30911-X.
4. L. Aceto and A. Ingólfssdóttir. Characteristic Formulae: From Automata to Logic. In *The Concurrency Column* (L. Aceto ed.), *Bulletin of the EATCS* 91, pp. 58–75, February 2007.
5. L. Aceto, A. Ingólfssdóttir, M. Mousavi and M. Reniers. Algebraic Properties for Free!. *Bulletin of the European Association for Theoretical Computer Science* 99, October 2009. To appear.

Journal Papers

1. L. Aceto, A. Birgisson, A. Ingólfssdóttir, M. Mousavi and M. Reniers. Rule Formats for Determinism and Idempotence. To appear in *Science of Computer Programming*, Special Issue devoted to FSEN 2009 (Farhad Arbab and Marjan Sirjani guest editors).
2. L. Aceto, S. Capobianco and A. Ingólfssdóttir. On the Existence of a Finite Base for Complete Trace Equivalence over BPA with Interrupt. *Bulletin of the EATCS* 95:220–240, June 2008. Available at <http://www.eatcs.org/bulletin/beatcs95.pdf>.

3. L. Aceto, S. Capobianco, A. Ingólfssdóttir and B. Luttik. The Equational Theory of Prebisimilarity over Basic CCS with Divergence. *Information Processing Letters* 108:284–289, 26 September 2008 (online publication). Available at <http://dx.doi.org/10.1016/j.ipl.2008.05.019>.
4. L. Aceto, T. Chen, W. J. Fokkink and A. Ingólfssdóttir. On the Axiomatizability of Priority. *Mathematical Structures in Computer Science* 18(1):5–28, February 2008. Special issue devoted to LMCS 2006 (Flavio Corradini and Carlo Toffalori eds.).
5. L. Aceto, W. J. Fokkink and A. Ingólfssdóttir. A Cancellation Theorem for BCCSP. *Fundamenta Informaticae* 88(1–2):1–21, 2008.
6. L. Aceto, W. J. Fokkink, A. Ingólfssdóttir and B. Luttik. A Finite Equational Base for CCS with Left Merge and Communication Merge. *ACM Transactions on Computational Logic* Volume 10, Number 1, January 2009. Available at <http://doi.acm.org/10.1145/1459010.1459016>.
7. L. Aceto, W. J. Fokkink, A. Ingólfssdóttir and MohammadReza Mousavi. Lifting Non-Finite Axiomatizability Results to Extensions of Process Algebras. *Acta Informatica* 47(3):147–177, May 2010.
8. L. Aceto, W. J. Fokkink, A. Ingólfssdóttir and S. Nain. Bisimilarity is not Finitely Based over BPA with Interrupt. *Theoretical Computer Science* 366(1–2):60–81, 2006. Special issue devoted to Algebra and Coalgebra in Computer Science (J. Fiadeiro and J. Rutten guest editors).
9. L. Aceto, W. J. Fokkink, A. Ingólfssdóttir and B. Luttik. Split-2 Bisimilarity has a Finite Axiomatization over CCS with Hennessy’s Merge. *Logical Methods in Computer Science*, Vol. 1 (1:3), 2005, 12 pages.
10. L. Aceto, W. J. Fokkink, A. Ingólfssdóttir and B. Luttik. CCS with Hennessy’s Merge has no Finite Equational Axiomatization. *Theoretical Computer Science* 330(3):377–405, 2005.
11. L. Aceto and A. Ingólfssdóttir. On the Expressibility of Priority. *Information Processing Letters* 109(1):83–85, 16 December 2008.
12. Geir Agnarsson, Ágúst Egilsson, Magnús Halldórsson. Vertex coloring acyclic digraphs and their corresponding hypergraphs. *Discrete Applied Mathematics* 156(10):1918–1928, 2008.

13. Geir Agnarsson and Magnús Halldórsson. Strongly simplicial vertices of powers of trees. *Discrete Mathematics* 307:2647–2652, 2007.
14. Geir Agnarsson and Magnús Halldórsson. Vertex coloring the square of outerplanar graphs of low degree. To appear in *Discussiones Mathematicae Graph Theory*, 2010.
15. Eyjolfur Ingi Ásgeirsson and Cliff Stein. Divide-and-Conquer Approximation Algorithm for Vertex Cover. *SIAM Journal on Discrete Mathematics* 23(3):1261–1280, 2009.
16. Eyjolfur Ingi Ásgeirsson and Cliff Stein. Bounded-space online bin cover. *Journal of Scheduling*, Springer Netherlands.
17. S. Avgustinovich, A. Glen, B. V. Halldrsson, S. Kitaev. On shortest crucial words avoiding abelian powers. *Discrete Applied Mathematics*, to appear.
18. S. Avgustinovich, S. Kitaev: On uniquely k -determined permutations, *Discrete Mathematics* **308** (2008), 1500–1507.
19. Reuven Bar-Yehuda, Seffi Naor, Magnús M. Halldórsson, Hadas Shachnai, and Irina Shapira. Scheduling Split Intervals. *SIAM Journal on Computing*, 36(1):1–15, 2006.
20. Thomas Bataillon, Thomas Mailund, Steinunn Thorlacius, Eirikur Steingrímsson, Thorunn Rafnar, Magnús M. Halldórsson, Violeta Calian, Mikkel H. Schierup. The effective size of the Icelandic population inferred from unphased microsatellite markers and the prospects for LD mapping. *European Journal of Human Genetics*, Advance online publication 31 May 2006; doi: 10.1038/sj.ejhg.5201669
21. M. Bousquet-Mélou, A. Claesson, M. Dukes, and S. Kitaev. $(2 + 2)$ -free posets, ascent sequences and pattern avoiding permutation. To appear in *Journal of Combinatorial Theory, Series A*.
22. M. Bousquet-Mélou and E. Steingrímsson: Decreasing subsequences in permutations and Wilf equivalence for involutions, *J. Algebraic Combin.* 22:383–409, 2005.
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