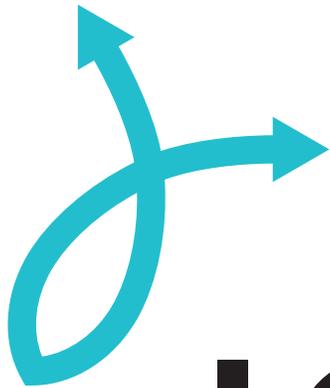


Annual Report 2015



ICE-TCS

Icelandic Centre of Excellence
in Theoretical Computer Science

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1 Introduction

The Icelandic Centre of Excellence in Theoretical Computer Science (ICE-TCS) celebrated its tenth birthday on 29 April 2015. This tenth 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 an overview of the activities of the centre in 2015. 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.

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 initially started as a collaboration between the Department of Computer Science, Faculty of Engineering, University of Iceland, and the School of Computer Science, Reykjavik University. From 2011 to 2013, the centre was based solely at Reykjavik University. In November 2013, Páll Melsted (University of Iceland and Decode Genetics) joined the centre, thereby restoring some of the original links with the University of Iceland. Moreover, ICE-TCS still has some affiliated members from the University of Iceland. However, it is fair to say that all the activities of the centre take place at Reykjavik University.

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

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

2 Executive Summary and Highlights for the Reporting Period

The calendar year 2015 has been an active one for ICE-TCS, both nationally and internationally. The following subsections survey briefly what the centre has achieved in the reporting period.

Research Highlights

At the time of writing, according to our records that are available at

<http://www.icetcs.ru.is/publications.pdf>,

ICE-TCS members have a total of 463 publications since the establishment of the centre: two books, 31 edited volumes, seven book chapters, 221 journal

papers, 195 conference and workshop papers and seven abstracts in peer-reviewed ISI-indexed journals. By way of comparison, the overall number of publications was 297 at the time of writing our annual report for 2010, 339 for 2011, 360 for 2012, 403 for 2013 and 435 for 2014.

The centre still has substantially more journal publications than conference publications. However, the difference between the two figures has been slowly decreasing in the last few years: it is now 26 and was 39 in our report for 2014, 43 in 2012 and 45 in 2011. We expect that this trend will continue in the coming years, but we will strive to continue publishing in journals a substantial percentage of our scientific work.

ICE-TCS contributes four out of the five Icelandic entries to the list of [DBLP most prolific authors](#).

Below, we limit ourselves to pointing out a few highlights of the research work carried out within the centre in the reporting period.

- The highlight of the year for the algorithms/wireless research group was a publication in the prestigious ACM Symposium on Theory of Computing (STOC) conference. This was a surprising result that leverages graphs in the solutions of various problems involving wireless scheduling, and obtains also matching limits on such an approach. These results have been applied and generalized further in papers that should appear in 2016.

Some additional notable results include distributed algorithms and models related to wireless computing, that appear in the PODC and DISC conferences, and streaming algorithms for finding large matchings that appear in the ESA conference.

- The bioinformatics group has cooperated with researchers at Decode Genetics to find genetic variants that influence the risk of diseases such as tuberculosis risk in populations of European ancestry and carried out work on population-scale detection of Alu polymorphisms.
- Notable results from the concurrency group include a paper published in MFCS devoted to the study of the connections between the notions of characteristic and prime formulae in process theory. The results presented in that paper elucidate the connections between equivalence checking and model checking.

The group has also obtained results on fragments of the modal mu-calculus that can be verified at runtime (presented at RV), on SOS rule formats for bounded nondeterminism and on the use of model checking

to study scheduling and battery consumption issues in mobile cloud computing systems (with papers at FACS and IEEE Mobile Cloud).

- The discrete mathematics group has continued its study of permutation patterns. A common question in the study of permutations is: given a set of permutations defined by some property, how many of each length are there? The group is developing an algorithm, called Struct, that tries to guess some structure given a set of permutations, which in some cases is sufficient to infer a generating function and provide an answer to the question. It has also carried out work connecting pattern avoiding permutations and independent sets in graphs.
- The formal methods for software engineering group has developed Probabilistic Timed Rebeca, a timed and probabilistic actor-based language for modeling distributed real-time systems with asynchronous message passing. The accompanying toolset for this language, which is based on PRISM and IMCA, allows one to analyze Probabilistic Timed Rebeca models against expected reachability and probabilistic reachability properties.

Events

During 2015, ICE-TCS members organized a large number of scientific events, both in Iceland and abroad.

ICE-TCS continued the Pearls of Computation seminar series that was started in January 2013. The talks in the Pearls of Computation series focus on presenting the life and work of some of the recipients of the ACM Turing Award or some other major award related to computer science in an accessible way. The Pearls of Computation talks at Reykjavik University are organized in collaboration with the School of Computer Science at Reykjavik University, CADIA (Center for Analysis and Design of Intelligent Agents), CRESS (Center on Research in Engineering Software Systems), the Icelandic Mathematical Society, IIIM (Icelandic Institute for Intelligent Machines) and the Mathematics Group at Reykjavik University.

On Friday, 21 August 2015, ICE-TCS held the eleventh edition of its annual Theory day, which featured talks by Gerard Berry (College de France) and Roger Wattenhofer (ETH Zurich), as well as a shorter talk by Hafsteinn Einarsson (ETH Zurich). Gerard Berry, recipient of the CNRS Gold Medal 2014, also delivered a public talk, entitled "The algorithmic revolution in the sciences" on August 20th.

ICE-TCS members organized one international conference at Reykjavik University, one informal one-day workshop and one public talk. In addition, three members of ICE-TCS served as PC chairs for three major international conferences, viz. NWPT, CONCUR and ICALP. Two members of ICE-TCS are now on the Council of the EATCS.

Below we list the main events in reverse chronological order. See

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

for more details.

- Monday, 2 November 2015: Magnus M. Halldorsson was elected to the Council of the EATCS.
- 21-23 October 2015: Luca Aceto and Anna Ingolfsdottir were PC co-chairs and organizers for the 27th Nordic Workshop on Programming Theory (NWPT 2015) at Reykjavik University.
- 6-11 September 2015: Magnus Halldorsson was an invited speaker at the Workshop on Cycles and colourings, High Tatras, Slovakia.
- 9-11 September 2015: Luca Aceto was an invited speaker at ICTCS 2015, the 16th Italian Conference on Theoretical Computer Science, Firenze, Italy.
- 31 August-5 September 2015: Luca Aceto was PC co-chair for the 26th International Conference on Concurrency Theory (CONCUR 2015), Madrid, Spain.
- Friday, 21 August 2015: The ICE-TCS Theory Day for 2015 took place at Reykjavik University. The event featured presentations by Gerard Berry (College de France), Hafsteinn Einarsson (ETH Zurich) and Roger Wattenhofer (ETH Zurich). During this event we also celebrated the tenth birthday of ICE-TCS, which was founded at the end of April 2005.
- Thursday, 20 August 2015: Gerard Berry (College de France) delivered a public talk entitled *The algorithmic revolution in the sciences*. This was a joint event with Visindafelag Islendinga.
- 20-21 August 2015: Gerard Berry (College de France), recipient of the CNRS Gold Medal 2014, visited ICE-TCS. During his stay, Gerard delivered a public talk and a presentation at the ICE-TCS Theory Day.

- 6-10 July 2015: Magnus M. Halldorsson was the PC chair for the Track C of ICALP 2015.
- 5 July 2015: Magnus M. Halldorsson organized the Sixth Workshop on Realistic models for Algorithms in Wireless Networks (WRAWN) in Kyoto, Japan. The workshop was co-located with ICALP 2015.
- Wednesday, 29 April 2015: ICE-TCS was ten years old!
- Tuesday, 21 April 2015: ICE-TCS researchers contributed three talks to the Reykjavik University Lecture Marathon for 2015. The talks were:
 - Anna Ingólfssdóttir. *Reasoning logically about knowledge is fun.*
 - Luca Aceto. *Are models logical?*
 - Henning Úlfarsson. *A surprising bijection between permutations and polygons.*
- Friday, 20 February 2015: Eyjólfur I. Ásgeirsson delivered an ICE-TCS seminar to celebrate the 100th anniversary of the birth of George Dantzig, who made important contributions to operations research, computer science, economics and statistics. This talk was originally scheduled for November 2014 but had to be delayed.
- Tuesday, 3 February 2015: The paper *How Well Can Graphs Represent Wireless Interference?* by Magnus M. Halldorsson and Tigran Tonoyan was accepted for STOC 2015: 47th Annual Symposium on the Theory of Computing, Portland, Oregon, June 15-17 2015. STOC is one of the most prestigious and competitive conferences in TCS.
- 24-29 January 2015: Magnus M. Halldorsson was an invited speaker at the 41st International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2015).
- Tuesday, 13 January 2015: Researchers affiliated with ICE-TCS were awarded three grants by the Icelandic Research Fund for 2015. The funded projects were:
 - Magnús M. Halldórsson (with Eyjólfur I. Ásgeirsson, Marijke Hilde Lore Bodlaender and Roger Wattenhofer). *Models of Unreliability and Dynamics in Wireless Networks.* Amount: 9,264,000 ISK.

- Páll Melsted (University of Iceland, together with Lior Samuel Pachter). *Streaming algorithms for whole genome assembly*. Amount: 9,950,000 ISK.
- Ýmir Vigfússon (with Leon Danon and Gudrun Sigmundsdottir). *Detecting outbreaks with mobile phone data*. Amount: 9,240,000 ISK.

These were the only grants awarded in the field of computer science this year.

- Sunday, 11 January 2015: Henning Ulfarsson delivered an invited presentation entitled *Struct: An algorithm for guessing the structure and enumeration of permutation sets* at the AMS Special Session on Enumerative Combinatorics that took place at the 2015 Joint Mathematics Meetings.

The ICE-TCS Pearls of Computation Events, in chronological order, are listed below.

- Friday, 23 January 2015: Christian Konrad delivered a Pearls of Computation talk. The talk, which was entitled *Philippe Flajolet: Does research. Smokes. Battles administration.*, was devoted to Philippe Flajolet and his work on the analysis of algorithms.
- Friday, 13 February 2015: Hannes H. Vilhjmsson delivered a Pearls of Computation talk entitled *J. C. R. Licklider: Man-Computer Symbiosis on the Intergalactic Computer Network*, on the work of J. C. R. Licklider.
- Friday, 6 March 2015: Daniel B. Sigurgeirsson delivered a Pearls of Computation talk entitled *Grace Murray Hopper: The queen of code*, devoted to the work of Grace Murray Hopper.
- Friday, 10 April 2015: Alvaro Garcia Perez delivered a Pearls of Computation talk entitled *The Essence of Reynolds*, devoted to the life and work of John C. Reynolds.
- Friday, 18 September 2015: Magnus M. Halldorsson delivered a Pearls of Computation talk entitled *Pearls of Computation: Christos Papadimitriou*, devoted to the work of one of the most interesting personalities in Computer Science.

- Friday, 9 October 2015: Luca Aceto delivered a Pearls of Computation talk entitled *Barbara Liskov: The Power and the Glory of Abstraction*, described some of the work of Barbara Liskov, who received the 2008 Turing Award from the ACM.
- Friday, 6 November 2015: Luca Aceto delivered a Pearls of Computation talk entitled *Michael O. Rabin: Automata, Logic and Randomness in Computation*.

Further information, including recordings of most of the talks, is available here

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

As in previous years, ‘regular’ events, such as talks in our seminar series, have been advertised locally and on our mailing lists. Events that are 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 continues to be 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. At the time of writing, ICE-TCS has organized and hosted over 275 seminars. During the reporting period, the **ICE-TCS Research Seminar series** hosted 23 seminars, not counting the talks delivered as part of the above-mentioned events.

3 Current Members

At the time of writing, ICE-TCS has nine permanent members (eight at Reykjavik University and one at the University of Iceland), namely Luca Aceto (Scientific Co-director), Eyjólfur Ingi Ásgeirsson, Yngvi Björnsson, Bjarni V. Halldórsson, Magnús M. Halldórsson (Scientific Director), Anna Ingólfssdóttir (Scientific Co-director), Páll Melsted, Marjan Sirjani and Henning Úlfarsson. In addition, since taking up an assistant professor position at Emory University, Ýmir Vigfússon holds a 20% position at Reykjavik University and still acts as an affiliated member of the centre.

In 2015, the centre hosted five postdoctoral researchers: Dario Della Monica (temporal logics, mentored by Luca Aceto and Anna Ingólfssdóttir), Ignacio Fabregas (concurrency theory, mentored by Luca Aceto and Anna

Ingólfssdóttir), Alvaro Garcia-Perez (lambda calculus and nominal calculi, mentored by Luca Aceto and Anna Ingólfssdóttir), Christian Konrad (design and the analysis of algorithms, mentored by Magnús M. Halldórsson) and Tigran Tonoyan (design and the analysis of algorithms, mentored by Magnús M. Halldórsson). In early 2016, Dario Della Monica and Ignacio Fabregas left ICE-TCS, but the algorithms group hired Agnes Cseh and Janne Korhonen, who are both mentored by Magnús M. Halldórsson.

During 2015, ICE-TCS hosted four PhD. students; Christian Bean (supervised by Henning Úlfarsson), Marijeke Bodlaender (supervised by Magnús M. Halldórsson), Ali Jafari and Ehsan Khamespanah (both supervised by Marjan Sirjani). However, Marijeke Bodlaender left the programme during the year and Ehsan Khamespanah is largely based in Tehran. After Ali Jafari's graduation in the spring of 2016, the centre has therefore only one active PhD student.

In the light of the lack of funding for PhD positions and of the competition for talented graduate students, it is unclear whether ICE-TCS will be training new doctoral students in the near future.

4 Funding

Despite the increasingly hard competition, ICE-TCS researchers continue to be fairly successful in obtaining grants from the Icelandic Research Fund. In the rounds of applications for projects starting in 2015, ICE-TCS researchers received funding from several sources. In particular, researchers affiliated with ICE-TCS have been awarded three grants by the Icelandic Research Fund for 2015. The funded projects are:

- Magnús M. Halldórsson (with Eyjólfur I. Ásgeirsson, Marijke Hilde Lore Bodlaender and Roger Wattenhofer) for the project *Models of Unreliability and Dynamics in Wireless Networks*. Amount: 9,264,000 ISK.
- Páll Melsted (University of Iceland, together with Lior Samuel Pachter) for the project *Streaming algorithms for whole genome assembly*. Amount: 9,950,000 ISK.
- Ýmir Vigfússon for the project *Detecting outbreaks with mobile phone data*. Amount: 9,240,000 ISK.

These were the only grants awarded in the field of computer science by the Icelandic Research Fund in 2015.

Andres Iroume (Georgia Institute of Technology, USA). Period: 18 December 2015.
 Yolanda Ortega Mallen (Universidad Complutense de Madrid, Spain). Period: 8-28 November 2015.
 David de Frutos Escrig (Universidad Complutense Madrid, Spain). Period: 17 October-1 November 2015.
 David Romero Hernandez (Universidad Complutense Madrid, Spain). Period: 17 October-1 November 2015.
 Mads Chr. Olesen (Aalborg University, Denmark). Period: 10-15 September 2015.
 Gerard Berry (College de France). Period: 17-21 August 2015.
 George Rabanca (City University New York, USA). Period: August 2015.
 Carlos Varela (Rensselaer Polytechnic Institute, USA). Period: 12 June 2015.
 Carlos Gregorio Rodriguez (Universidad Complutense Madrid, Spain). Period: 3-30 June 2015.
 Dominic Orchard (Imperial College, London, UK). Period: 3 June 2015.
 Michael Albert (University of Otago, New Zealand). Period: 31 May-14 June 2015.
 Joshua Sack (University of Amsterdam, NL). Period: 24-31 May 2015.
 Cheyne Homberger University of Maryland, Baltimore County. Period: 18-20 May 2015.
 David de Frutos Escrig (Universidad Complutense Madrid, Spain). Period: 15 May-15 June 2015.
 David Romero Hernandez (Universidad Complutense Madrid, Spain). Period: 13 May-15 June 2015.
 Zoltan Esik (University of Szeged, Hungary). Period: 14-24 April 2015.
 Cesar Augusto Nieto Coria (University of Camerino). Period: April-July 2015.
 Adrian Francalanza (University of Malta). Period: January-July 2015.

Table 1: ICE-TCS Guests in 2015

In addition, Luca Aceto and Anna Ingólfssdóttir obtained funding for the project *Formal Methods for the Development and Evaluation of Sustainable Systems* under the Programme NILS Science and Sustainability (Abel—Coordinated Mobility for Researchers) as part of the Priority Sectors Programme of the EEA Grants Framework. The project is a collaboration between Reykjavik University and Universidad Complutense de Madrid, and is led by Luca Aceto and Anna Ingólfssdóttir (RU) and David de Frutos Escrig (UCM). The total funding is 100,050 euros for the period 2014–2015.

Unlike in previous years, the School of Computer Science now provides a small amount of funding for centre-related activities.

5 Activities in 2015

5.1 Guests

During the reporting period, we received 18 guests from foreign institutions for short stays. These are listed in Table 1 in reverse chronological order. All the guests delivered seminars and/or contributed (mini-)courses organized by the centre.

5.2 Organization of Conferences, Symposia and Workshops

Members of the centre have served as organizers and PC members for the several events. The following list offers a very small sample. Further information can be obtained from the curricula of the members of the centre and from Section 2.

- Luca Aceto: **FORTE 2015, the 35th IFIP International Conference on Formal Techniques for Distributed Objects, Components and Systems**, June 2–5, 2015, Grenoble, France. (PC member)
- Luca Aceto: **TOPDRIM International School on Topology and Data, EATCS 2nd Young Researchers School, Understanding Complexity and Concurrency through Topology**, Camerino, Italy, July 13–24, 2015. (PC member)
- Luca Aceto: **26th International Conference on Concurrency Theory (CONCUR 2015)**, 1–4 September, Madrid, Spain. (PC co-chair)
- Luca Aceto and Anna Ingólfssdóttir: **27th Nordic Workshop on Programming Theory (NWPT'15)**, 21–23 October 2015, Reykjavik University, Iceland. (PC co-chair and co-organizer)
- Eyjólfur I. Ásgeirsson: **12th Workshop on Models and Algorithms for Planning and Scheduling Problems (MAPSP)**, 8-12 June 2015. (PC Member)

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 Tables 2 and 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 2015, 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 23 seminars in this series during the reporting period. (See <http://www.icetcs.ru.is/rsem.html> for details on these talks.)

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. An example of the former use of a reading group is provided by the weekly concurrency lunch meetings. The weekly meeting of the wireless networking subgroup has included a reading group on game theory and auctions. Moreover, Marjan Sirjani holds weekly lunches with students working on formal methods in software engineering on Fridays.

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 APPROX-RANDOM, SODA and PODC and in some of the top journals, such as the Theoretical Computer Science and Theory of Computing Systems. Yngvi Björnsson's work on search-methods in artificial intelligence and on general game playing continues to have 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,

Membership and Steering of Learned Bodies CHECK/EDIT

- Luca Aceto is the president of the EATCS (July 2012–July 2016).
- Luca Aceto is member of the Informatics section of the [Academia Europaea, the Academy of Europe](#) (July 2014 onwards).
- Luca Aceto is member of the Executive Committee of the [ACM Special Interest Group on Logic and Computation \(SIGLOG\)](#) (2014–to date).
- Luca Aceto is member of the Awards Committee of the [ACM Special Interest Group on Logic and Computation \(SIGLOG\)](#) (2014–to date).
- Luca Aceto is member of the [Committee for the PhD in Computer Science at the Gran Sasso Science Institute](#), L'Aquila, Italy (2014–to date).
- Luca Aceto is a member of the advisory board of [Electronic Proceedings in Theoretic Computer Science \(EPTCS\)](#).
- Luca Aceto is a member of the Organizing Committee for the [ACM/IEEE Symposium on Logic in Computer Science](#) (2012–2014).
- Luca Aceto is a member of the Board of the [European Association for Computer Science Logic \(EACSL\)](#).
- Luca Aceto is a member of the Board of the journal [Logical Methods in Computer Science](#).
- Yngvi Björnsson is a member of the Education Committee of the Icelandic Association of Computer Scientists.
- Yngvi Björnsson is a member of the evaluation committee for the Research Infrastructure Fund of the Icelandic Research Fund.
- Bjarni V. Halldórsson is a committee member of the IFIP working group on computational biology.
- Bjarni V. Halldórsson is event organizer for the EURO working group on computational biology.
- 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.
- Magnús M. Halldórsson is a member of the steering committee for the European Symposium on Algorithms.
- Anna Ingólfssdóttir is a member of the steering committee for the [Workshop on Fixed Points in Computer Science \(FICS\)](#).
- Anna Ingólfssdóttir is a member of the board of the Icelandic Mathematical Society.
- Marjan Sirjani is a member of the steering committee for DisCoTec (International Federated Conference on Distributed Computing Techniques).
- Henning Úlfarsson is the chairman of the Icelandic Mathematical Society.

Membership of Editorial Boards

- Information and Computation, Elsevier. (Luca Aceto guest editor of a special issue devoted to ICALP 2011)
- Logical Methods in Computer Science. (Luca Aceto guest editor of a special issue devoted to FOSSACS 2012)
- 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)
- Frontiers in Statistical Genetics and Methodology. (Bjarni V. Halldórsson editor)
- Discrete Mathematics and Theoretical Computer Science. (Magnús M. Halldórsson managing editor)
- Soft Computing Journal (to be published by University of Kashan). (Marjan Sirjani Editor-in-Chief)

Table 3: Editorial Activities of Members of ICE-TCS

ICE-TCS researchers published journal papers in outlets such as Mathematical Structures in Computer Science, Science of Computer Programming, Theoretical Computer Science and Information Processing Letters.

Since our last annual report, ICE-TCS researchers have published three edited volumes, one book chapter, 11 journal papers and 13 conference and workshop papers. By way of comparison, in the previous reporting period the corresponding figures were of three edited volumes, 11 journal papers and 8 conference and workshop papers.

Full details on the publications by members of the centre since its inception may be found at

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

7 Forthcoming Activities

During 2016, we plan to continue our work with the aim of achieving the objectives stated in Section 1. The levels of ambition and activity remain high within ICE-TCS, and we hope that 2016 will be as successful as the previous years were.

The calendar year 2016 will be rich of events that see major involvement from ICE-TCS members. The following events are confirmed at the time of writing.

- From January 2016, ICE-TCS will continue organizing the Pearls of Computation seminar series—see <http://www.icetcs.ru.is/poco.html> for details. The first three talks in the spring 2016 will be devoted to presentations of the work by David Johnson, Doron Zeilberger and Kurt Gödel.
- We held the 12th ICE-TCS Theory Day on Friday, 27 May 2016. The programme included talks by Tamás Fleiner (Budapest University of Technology and Economics, Hungary) and by ICE-TCS researchers Álvaro Garcia-Pérez and Christian Konrad.
- In the period 1–3 June 2015, Marjan Sirjani was general chair for the 12th International Conference on integrated Formal Methods, iFM 2016, at Reykjavik University.
- On Saturday, 4 June 2016, Luca Aceto, Adrian Francalanza and Anna Ingólfssdóttir organized the workshop Pre- and post-deployment verification techniques (PrePost), co-located with iFM 2016. The invited speakers were Dino Distefano and Kim G. Larsen.

- In the period 22–24 June 2016, Magnús M. Halldórsson organized the 15th Scandinavian Symposium and Workshops on Algorithm Theory (SWAT 2016) at Reykjavik University. The programme for the event included invited talks by Julia Chuzhoy, Dániel Marx and Christos Papadimitriou.

In June 2017, Luca Aceto and Anna Ingólfssdóttir will organize LICS 2017 at Reykjavik University. This will bring another truly major TCS conference to Reykjavik University. The main conference will be held in the period 20–23 June 2017 and the affiliated workshop will take place in the period 18–19 June 2017.

8 Summary and Self-Evaluation

The reporting period has seen ICE-TCS continue to achieve a fair amount of visibility in the research community. The centre has been very active in organizing high-quality scientific events at Reykjavik University and some of its members have served on the PCs of conferences and workshops in theoretical computer science, and play leadership roles in PCs, steering committees and boards for conferences, journals and learned societies. These are all signs of recognition for the research work that has been carried out within the centre, and for the role that the centre as a whole has played in the theoretical-computer-science community since its inception.

Scientifically, the centre has continued to play an important role in the computer-science and discrete mathematics communities in Iceland. As in previous years, the vast majority of the scientific events in those fields taking place in Iceland have been associated with the centre and, to the best of our knowledge, the ICE-TCS seminar series and guest program are pretty much unique in the country. Internationally, the centre has continued to contribute to the TCS community via its research output and its service activities.

Overall, we feel that we can be proud of what has been achieved in 2015. However, we have lost some of our postdoctoral researchers and some permanent members of the centre have left Reykjavik University. In particular, Marjan Sirjani has taken up a professor position at Mälardalen University in Sweden and Ýmir Vigfússon is now an assistant professor at Emory University. It is unclear whether the School of Computer Science will hire faculty members in TCS in the future. Indeed, prospective new hires will most likely focus on applied areas of computer science.

Moreover, the centre has a shortage of PhD students and it seems to be difficult to find suitable doctoral students to work on funded research

projects led by ICE-TCS researchers. Fortunately, Henning Úlfarsson has been very successful in involving bright students from our Discrete Mathematics and Computer Science programme in his research via Undergraduate Research Opportunities and master thesis projects. Attracting students to TCS remains one of the areas in which we need to be more successful.

Overall, we feel that we can be pleased with the quality and the quantity of the research work carried out by our members, and with the ensuing publications. In keeping with the centre's ambitions, it will be a useful exercise for us to find ways to increase the influence and activities of ICE-TCS even further. However, growth in the centre's research activities will strongly depend on increasing the number of its permanent members and on the quality of the PhD students and postdoctoral researchers that we will manage to attract. Our own experience over the last two or three years indicates that it might be easier for us to attract postdoctoral researchers than PhD students. The main obstacle to attracting postdoctoral researchers is the lack of funding, and we will have to do our best to be successful in grant-winning.

The leadership of the centre has not changed since its inception. We feel that the time is ripe for giving more responsibilities to the younger members of the centre and for a restructuring of our organizational structure.

We look forward to meeting the challenges ahead and to offering our contribution to the theoretical computer science community. We trust that the organization of LICS 2017 will further enhance the reputation of the centre and witness our willingness to serve the community.