Annual Report 2017

ICE-TCS

Icelandic Centre of Excellence
in Theoretical Computer Science

Contents

1 Introduction

The Icelandic Centre of Excellence in Theoretical Computer Science (ICE-TCS) celebrated its twelfth birthday on 29 April 2017. As usual, this twelfth 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 2017. 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.

This annual report will focus on the main highlights of a busy year for ICE-TCS and refer our readers to the data collected at the centre's web page at

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http://www.icetcs.ru.is

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for full details.

2 Executive Summary and Highlights for the Reporting Period

Once again, the calendar year 2017 has been an active one for ICE-TCS, both nationally and internationally. Indeed, amongst other things, researchers at the centre received two best papers awards at high-quality international conferences and one university-level teaching award, were invited speakers at two international events, and organized very well attended conferences and workshops at Reykjavik University and Aalborg University.

The quality and impact of the research carried out by the members of the centre in 2017 is witnessed by the following main achievements.

- The paper *Universal Framework for Wireless Scheduling Problems* by Eyjólfur I. Ásgeirsson, Magnús M. Halldórsson and Tigran Tonoyan received the best paper award for Track C at ICALP 2017. ICALP is the annual conference of the European Association for Theoretical Computer Science and is one of the prime annual events in the field of Theoretical Computer Science.

- The paper *Leader Election in SINR Model with Arbitrary Power Control* by Magnús M. Halldórsson, Stephan Holzer and Evangelia Anna Markatou received the SIROCCO 2017 best paper award. SIROCCO 2017 was the 24th International Colloquium on Structural Information and Communication Complexity.

- Luca Aceto was invited speaker at

  - the 8th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF'17, Rome, Italy, 20–22 September 2017),
  - TLT Types and Logic in Torino, Colloquium in honor of Mariangiola Dezani-Ciancaglini, Simona Ronchi Della Rocca and Mario Coppo, Turin, Italy, 22 September 2017, and
  - the 2nd Logic Mentoring Workshop, co-located with LICS 2017, Reykjavik, Iceland, 18 June 2017.

- In March 2017, Magnús M. Halldórsson, the scientific director of ICE-TCS, became the first researcher at Reykjavik University to have an h-index of 40 according to Google Scholar. Even though one has to take metrics with a pinch of salt, we feel that this gives an indication of the impact of the work of the algorithmics group at ICE-TCS on the research community.

- At the start of 2017, the project *New horizons in algorithms for wireless networks*, with Magnús M. Halldórsson as principal investigator, was funded by the Icelandic Research Fund. The funding for the project is of $15,625,000$ ISK (roughly $129,323$ Euros).

As in previous years, ICE-TCS researchers organized high-quality scientific events at Reykjavik University and elsewhere, increasing the international

visibility of the centre and of Reykjavik University as a whole. To wit, we mention the following events.

- In the period 18–23 June 2017, Luca Aceto and Anna Ingólfsdóttir organized the Thirty-Second Annual ACM/IEEE Symposium on Logic in Computer Science (LICS 2017) at Reykjavik University. The main conference was preceded by seven co-located workshops, including the firt edition of Women in Logic and the second Logic Mentoring Workshop, which was also co-sponsored by ICE-TCS. Overall, the conference and the workshops were attended by 234 researchers from all over the world.

- In the period 26–30 June 2017, Henning Úlfarsson organized Permutation Patterns 2017, The 15th International Conference on Permutation Patterns at Reykjavik University.

- In the period 19–20 August 2017, Luca Aceto and Anna Ingólfsdóttir organized the KiMfest 2017, a two-day conference in honour of Kim G. Larsen on the occasion of his 60th birthday, in cooperation with Giorgio Bacci, Giovanni Bacci, Axel Legay and Radu Mardare. They also co-edited an accompanying festschrift in the LNCS series published by Springer.

- The 13th annual ICE-TCS Theory Day was held on the 28th of April 2017. The event featured invited talks by Dexter Kozen (Cornell University) and Jason P. Smith (Department of Computer and Information Sciences, University of Strathclyde). The day before the Theory Day, Dexter Kozen gave a public talk and held a mentoring session for students and young researchers of all ages at Reykjavik University.

- ICE-TCS celebrated Anna Ingólfsdóttir's 65th birthday with a workshop held on the 17th of February 2017, which featured invited talks by Kim G. Larsen (Aalborg University) and Hanne Riis Nielson (DTU).

In October 2017, Luca Aceto was elected as chair of the LIPIcs (Leibniz International Proceedings in Informatics) editorial board for a two-year period. He is also a member of the Steering Committee for GandALF. Tarmo Uustalu is vice-chair of the COST action EUTYPES (March 2016–March 2020) and a member the Executive Group of the Steering Committee of ETAPS. He was also visiting professor at Université Paris Diderot for a month in 2017. These are further signs of recognition for the centre as a whole.

During the reporting period, there were 13 seminars in the ICE-TCS research seminar series and two in the Pearls of Computation seminar series (which is aimed at a general public). ICE-TCS also hosted 10 guests, each of whom delivered a talk at one of our events and contributed to the local research environment.

2.1 Research Output

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 506 publications since the establishment of the centre: two books, 40 edited volumes, 10 book chapters, 231 journal papers, 216 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, 435 for 2014 and 463 for 2015. (Since the annual report for 2016 was only available four months ago, we do not think that it is meaningful to compare the current number of publications with the number mentioned there.)

The centre still has more journal publications than conference publications. However, the difference between the two figures has been slowly decreasing in the last few years. 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.

3 Current Members

At the time of writing, ICE-TCS has nine permanent members (seven at Reykjavik University and one at deCODE Genetics and at the University of Iceland), namely Luca Aceto, Eyjólfur Ingi Ásgeirsson (Scientific Co-director), Yngvi Björnsson, Bjarni V. Halldórsson, Magnús M. Halldórsson (Scientific Director), Anna Ingólfsdóttir (Scientific Co-director), Páll Melsted, Henning Úlfarsson and Tarmo Uustalu.

In September 2017, Luca Aceto took up a position as Professor of Computer Science at the Gran Sasso Science Institute in L'Aquila. However, he keeps a part-time position at Reykjavik University and still actively contributes to the activities of ICE-TCS. Tarmo Uustalu joined Reykjavik University and ICE-TCS from Tallinn University of Technology in October 2017.

He extends the research areas covered by the centre, adding his expertise in topics such as structural proof theory and type theory (deductive systems and typed term calculi for intuitionistic and related logics), algebraic and categorical logic, semantics of programming languages and program logics.

In 2017, the centre hosted the postdoctoral researchers Antonis Achilleos (logic in computer science, runtime verification) and Tigran Tonoyan (design and analysis of algorithms), and one PhD. student, namely Christian Bean (supervised by Henning Úlfarsson). Tarmo Uustalu supervises Hendrik Maarand, a doctoral student at Tallinn University of Technology. In addition, Luca Aceto and Anna Ingólfsdóttir co-supervise Duncan Paul Attard and Ian Cassar, two PhD students from the University of Malta who are enrolled in a joint Reykjavik University/University of Malta doctorate and whose main supervisor is Adrian Francalanza. It is clear that we should do better, and hope to attract PhD students to the centre using some financial support that has now been made available by the School of Computer Science at Reykjavik University. We also hope to be in a position to hire more postdocs, but this will strongly depend on the success of our ongoing grant applications to the Icelandic Research Fund. (The outcome of our grant applications will be know at some point in January 2018.)

4   A first look at 2018

It is early days to say what the year 2018 will bring, but the omens seem to be good since ICE-TCS researchers are already playing an important role in the organization of scientific events.

On the 4th of January 2018, in collaboration with the Icelandic Academy of Sciences, the Icelandic Physical Society and Reykjavik University, ICE-TCS organized a public talk by Eugenio Coccia (Rector of the Gran Sasso Science Institute, L'Aquila, Italy) entitled *The dawn of gravitational wave astronomy.* The lecture, which was attended by about 130 people, introduced the 2017-Nobel-Prize-winning work that led to the discovery of gravitational waves and discussed its future potential.

During the week 22–26 January 2018, Adrian Francalanza (University of Malta) and Karoliina Lehtinen (Christian-Albrechts University of Kiel, Germany) will visit ICE-TCS and will contribute to a meeting starting the third and final year of the TheoFoMon project, which is led by Luca Aceto, Adrian Francalanza and Anna Ingólfsdóttir. As part of the project, Duncan Paul Attard and Ian Cassar (both at the University of Malta) will be visiting ICE-TCS in the period 15 January–15 March 2018.

Catia Trubiani (Gran Sasso Science Institute, Italy) will visit ICE-TCS in the period 30 April–4 May 2018.

Tarmo Uustalu is preparing the 2018 edition of the Estonian Winter School in Computer Science (EWSCS 2018) and he will co-chair the PC of the upcoming ICTAC 2018 conference (Stellenbosch, South Africa, 12–19 October 2018) with Bernd Fischer.

At the time of writing, the date for the 2018 edition of the ICE-TCS Theory Day has not been set yet. As usual, we plan to invite at least one speaker from outside Iceland. The programme and the actual date for the event might depend on who will visit the centre and when.

Finally, we mention that ICE-TCS researchers will be presenting their work at high-quality conferences in the first four months of 2018.

Overall, the levels of ambition and activity remain high within ICE-TCS, and we hope that 2018 will be as successful as the previous years were.

5   Summary and Self-Evaluation

The reporting period has seen ICE-TCS continue to achieve a fair amount of visibility in the research community. The research carried out by the algorithms group at ICE-TCS received best paper awards at ICALP 2017 (Track C) and SIROCCO 2017. 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.

During the reporting period, we decided to stop organizing the Pearls of Computation seminars, which were badly attended despite our best efforts.

The number of seminars in the ICE-TCS seminar series has been lower than usual over the last two years. Given the research activity of the mem-

bers of the centre, the frequency of the seminars could be increased by making the members of the centre present their work more regularly to everyone else. This might also foster a better mutual understanding of the topics that are the subject of ongoing research within the centre.

As mentioned previously, Luca Aceto became a professor at the Gran Sasso Science Institute in L'Aquila, Italy, in September 2017, but he maintains a 30%-affiliation with Reykjavik University and will continue to offer some contribution to ICE-TCS activities. He stepped down as scientific co-director of ICE-TCS and was replaced by Eyjólfur I. Ásgeirsson in that role.

We were happy to welcome a computer scientist of Tarmo Uustalu's stature to ICE-TCS. Tarmo will further expand the research portfolio of the centre and will connect it with the research community on types and programming-language semantics.

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. The School of Computer Science at Reykjavik University is currently hiring new faculty members and, for the first time in years, theoretical computer science is one of the focus areas. Moreover, the School of Computer Science at Reykjavik University has recently decided that it will provide financial support for PhD positions in an effort to increase the number of PhD students within the school. It will be interesting to see whether ICE-TCS will manage to attract strong applicants for the faculty and PhD positions from the CS theory community. To our mind, this will be an acid test for the reputation and the attractiveness of the centre.

We look forward to what the future will bring, and to reviving some of the pioneering spirit and sense of shared commitment to our mission that characterized the first decade of ICE-TCS now that the centre has become a teenager.