

# TC1 “Foundations of Computer Science” Activity Report

*Luís Soares Barbosa, TC1 chair*

## 1 Introduction

Established as Special Group (SG14) in 1989 and approved as a Technical Committee in 1996, TC1 aims at supporting the development of Theoretical Computer Science as a fundamental science, and its engineering, as well as the design of bridges with other sciences and their applications.

This annual activity report, covering essentially the period from 1 July 2023 – 30 June 2024, will be presented to the IFIP General Assembly, to take place in Lisbon, from 19 to 20 September, 2024.

## 2 TC1 Activities

Unfortunately, the coordination of TC1 along this period was almost with no activity, due to a number of personal circumstances affecting the TC Chair. Basically, TC1 continued to

- support the initial steps of the new WG 1.11/2.17 on Foundations of Quantum Computation;
- participate actively in the *IFIP Digital Education Task Force*, created in the 2022 GA, developing the joint report component on *computational thinking and teaching Computer Science as a science*; a final report will be ready in 2025;
- start the migration for a new web-site, a process to be concluded until the end of the current year.

TC1 business meeting in 2024 is scheduled for next October, which will formally launch the electoral process for choosing a new TC1 chair before the end of the year.

## 3 Working Group administration, membership and dynamics

The scientific activity of TC1 takes place in its Working Groups. All of them have either their own flagship conferences and/or are deeply involved in the organisation of conferences with which they collocate their own workshops and business meetings.

The WG activity reports, collected in Appendix A to this document, and their web pages, give a good account of both their internal dynamics, and the scientific subjects that their communities are currently tackling.

The list of Working Groups of TC1, with their chairs, vice-chairs and secretaries, whenever applicable, as of the date of writing, is thus established as follows.

WG		Chair	Secretary
1.02	Descriptive Complexity	Rogério Reis Ian McQuillan (Vice)	Andreas Malcher
1.03	Foundations of System Specification	Corina Cîrstea Holger Schlingloff (Vice)	Fabio Gadducci
1.05	Cellular Automata and Discrete Complex Systems	Nazim Fatès Henryk Fukō (Vice)	Luca Mariot
1.06	Rewriting	Cynthia Kop Carsten Fuhs (vice)	Carsten Fuhs
1.07	Theoretical Foundations of Security Analysis and Design	Sebastian Mödersheim Véronique Cortier (Vice)	Luca Viganò
1.08	Concurrency Theory	Pedro R. D'Argenio	Ana Sokolova
1.09	Verified Software	Jim Woodcock	Natarajan Shankar
1.10	String Algorithmics & Applications	Jan Holub	
1.11	Foundations of Quantum Computation	Ina Schaefer	Tobias Osborne

## Appendix A

# Reports from TC1 Working Groups

## WG 1.02 – Descriptive Complexity

**Chair:** Prof. Rogério Reis, Universidade do Porto, Portugal

**Vice-Chair:** Prof. Ian McQuillan, University of Saskatchewan, Canada

**Secretary:** Dr. Andreas Malcher, Universität Giessen, Germany

**Home page:** [www.informatik.uni-giessen.de/ifipwg1.2](http://www.informatik.uni-giessen.de/ifipwg1.2)

### BRIEF ACTIVITY REPORT

Descriptive complexity has historically been a multidisciplinary area of study, with contributions from automata theory, computational complexity, cryptography, information theory, probability, statistics, pattern recognition, machine learning, computational learning theory, computer vision, neural networks, formal languages and other fields. The aims of the working group are therefore to promote research in all aspects of descriptive complexity through conferences, publications, and more informal means of scientific interaction such as electronic forums. Since 2002 particular emphasis was and is being placed on the descriptive complexity of bio-inspired computing models and the relationship between descriptive complexity and software reliability.

The scope of the working group encompasses all aspects of descriptive complexity, both theory and application. These aspects include but are not limited to

- descriptive complexity of formal systems and structures,
- various measures of descriptive complexity of automata, grammars, languages and of related systems,
- trade-offs between descriptive complexity and mode of operation,
- circuit complexity of Boolean functions and related measures,
- succinctness of description of (finite) objects,
- descriptive complexity in resource bounded or structure bounded environments,
- structural complexity,
- descriptive complexity of formal systems for applications (for example, software reliability, software and hardware testing, modeling of natural languages),
- descriptive complexity aspects of nature motivated (bio-inspired) architectures and unconventional models of computing,
- algorithmic and other descriptive theories of randomness.

Furthermore, the WG tries to promote interaction and the exchange of information across traditional discipline boundaries and to provide a point of contact for all researchers in all disciplines interested in descriptive complexity and its applications.

## Organisation of WG and Membership

### Chairpersonship

Prof. Rogério Reis, Universidade do Porto, Portugal

## New members

The membership of the IFIP Working Group 1.02 has been maintained as follows:

Luca Prigioniero (UK),  
Juraĵ Sebeĵ (SK),  
Taylor J. Smith (CA),

have been added to the list of the members of the working group.

## Scientific activities and meetings

### Events organised by the Working Group

- The *26th International Conference on Descriptive Complexity of Formal Systems (DCFS 2024)* was planned to be organised, under supervision of the DCFS steering committee, by Nicholas Tran (Santa Clara University) and the PC co-chair Henning Bordihn (University of Potsdam) from June 25 to 27, 2024 in Santa Clara, CA, USA. Given the specially small number of submissions, it was decided to cancel the realisation of this edition of the conference. Not forgetting the trend towards a decrease in the number of researchers working in theoretical computing, the scheduling of a date too early in the year, less successful dissemination of the "call for papers" and the current year's geographical dispersion of conferences in this area are the primary causes of this failure.
- We have, in February, started an online monthly seminar, "One FLAT World Seminar" (<https://flat.fc.up.pt>), on Formal Languages and Automata. The seminar, organised by Luca Prigioniero and Rogério Reis, had already five talks, with an average of 50 participants.

### Formal meetings of the Working Group

- With the cancellation of the annual conference, the WG1.02 meeting planned to take place there did not happen.
- The next formal meeting of the working group is planned in 2025 on the occasion of DCFS 2024 in Loughborough, UK.

### Forthcoming events

- *26th International Conference on Descriptive Complexity of Formal Systems (DCFS 2025)*. The conference will be held in Loughborough, UK, and it will be organized by Luca Prigioniero from June, on the fourth week of July.

### Publications

- International Journal of Foundations of Computer Science, special issue with selected and extended papers of the 23rd International Conference on Descriptive Complexity of Formal Systems (DCFS 2021), guest editors: Yo-Sub Han, Sang-Ki Ko, in preparation.
- Theoretical Computer Science, special issue with selected and extended papers of the 24th International Conference on Descriptive Complexity of Formal Systems (DCFS 2022), guest editors: Yo-Sub Han, György Vaszil, in preparation.
- Information and Computation, special issue with selected and extended papers of the 25th International Conference on Descriptive Complexity of Formal Systems (DCFS 2023), guest editors: Henning Bordihn, Nicholas Tran, György Vaszil, in preparation.

## WG 1.03 — Foundations of System Specification

**Chair:** Dr. Corina Cîrstea, School of Electronics and Computer Science, University of Southampton, UK

**Co-Chair:** Prof. Dr. Holger Schlingloff, Fraunhofer FOKUS and Humboldt University of Berlin, Germany

**Secretary:** Prof. Dr. Fabio Gadducci, Dipartimento di Informatica, University of Pisa, Italy

**Home page:** [ifipwg13.cs.ovgu.de](http://ifipwg13.cs.ovgu.de)

### BRIEF ACTIVITY REPORT

## Organisation of WG and Membership

### Membership

The group is keeping a stable level of around 40 members (excluding emeritus members) and has considered one observer (Max Tschaikowski) in the current report period. Max Tschaikowski joined the group in February 2024. Rolf Hennicker was granted emeritus status. Two new observers, Benjamin Kaminski and Kyungmin Bae, will join as observers at the next meeting.

## Scientific activities and meetings

### Meetings

A meeting, attended by 20 members and 1 observer, was held in Salzburg, Austria, between 5-8 February 2024. The programme consisted of 1 observer talk (Max Tschaikowski) and 13 member talks.

The next meeting will be held in Crete, Greece, between 1-2 November 2024, colocated with ISoLA/AISoLA, and will be organised by Martin Wirsing.

### Published Proceedings

- The proceedings of the 17th International Workshop on Coalgebraic Methods in Computer Science (CMCS 2024) were published in volume 14617 of Lecture Notes in Computer Science.
- The proceedings of the 17th International Conference on Graph Transformation (ICGT 2024) were published in volume 14774 of Lecture Notes in Computer Science.
- A selection of papers from the 26th International Workshop on Recent Trends in Algebraic Development Techniques (WADT 2024) will be published in a forthcoming volume of Lecture Notes in Computer Science.

### Special Issues

- A special issue consisting of selected papers from CALCO 2023 (the 10th Conference on Algebra and Coalgebra in Computer Science) is under way.

## Events organised by the Working Group

- The *17th International Workshop on Coalgebraic Methods in Computer Science* (CMCS 2024) was held in Luxembourg, as part of ETAPS 2024. The workshop attracted 19 submissions: 15 regular papers and 4 short contributions, of which 10 regular papers and all short contributions were accepted.

The programme featured a keynote talk by Shin-ya Katsumata (Kyoto Sangyo University, Japan), invited talks by Henning Basold (Leiden University, the Netherlands) and Dana Fisman (Ben Gurion University, Israel), and a Special Session on “*Coalgebras in proof Assistants and Type Theory*”, with tutorial talks by Paige Randall North (Utrecht University, the Netherlands) and Niccolo Veltri (Talinn University of Technology, Estonia).

The proceedings were published in the IFIP-LNCS series.

- The 17th International Conference on Graph Transformation (ICGT 2024) was held in Edschede, the Netherlands, as part of STAF 2024 (Software Technologies: Applications and Foundations). The conference attracted 22 paper submissions, of which 12 were accepted.

The programme featured keynote talks by Marielle Stoelinga (Radboud University, Nijmegen) on *Graphs, Logics and Transformations for Effective Risk Analysis* and by Tiago Prince Sales (University of Twente) on *Ontological Foundations for Building Knowledge Graphs* and a tutorial by Kazunori Ueda (Waseda University) on *Gentle Introduction to LMNtal: Language Design and Implementation*.

The proceedings were published in the IFIP-LNCS series and a special issue is under way.

- The 27th International Workshop on Algebraic Development Techniques (WADT 2024) was held in Edschede, the Netherlands, as part of STAF 2024 (Software Technologies: Applications and Foundations). The workshop attracted 8 abstract submissions, all of which were accepted.

The programme featured keynote talks by Bernhard Möller (University of Augsburg) on *Some Uses of Modal Semirings* and Jan Bergstra (University of Amsterdam) on *Common Meadows with Infinite Values*.

A selection of extended versions of the submitted abstracts will be published in the IFIP-LNCS series.

## Forthcoming events

- The *11th International Conference on Algebra and Coalgebra in Computer Science* will be held in Glasgow, Scotland in June 2025, colocated with the Conference on the Mathematical Foundations of Programming Semantics (MFPS 2025). The PC chairs are Corina Cîrstea and Alexander Knapp.

# WG 1.05 — Cellular Automata and Discrete Complex Systems

**Chair:** Nazim Fatès — Inria Nancy Grand-Est, Nancy, France

**Vice-Chair:** Henryk Fukś — Brock University, St. Catharines, Ontario, Canada

**Secretary:** Luca Mariot — Digital Security Group , Radboud University, Nijmegen , 6525 EC, The Netherlands

**Home page:** <https://ifipwg15.inria.fr>

## BRIEF ACTIVITY REPORT

The Working Group 1.5, on *Cellular Automata and Discrete Complex Systems*, reestablished in 2008, has the following attributions:

- To establish and maintain a permanent, international, multidisciplinary forum for the collaboration of researchers in the field of Cellular Automata (CA) and Discrete Complex Systems (DCS).
- To provide a platform for presenting and discussing new ideas and results.
- To support the development of theory and applications of CA and DCS (e.g. parallel computing, physics, biology, social sciences, and others) as long as fundamental aspects and their relations are concerned.
- To identify and study within an inter- and multidisciplinary context, the important fundamental aspects, concepts, notions and problems concerning CA and DCS.

The scope of the working group encompasses all fundamental aspects of cellular automata and discrete complex systems, including: Dynamics, Algebraic aspects, Complexity issues, Emergent properties, Formal language processing, Models of parallelism and distributed systems, Phenomenological descriptions, Scientific modelling and Practical applications.

## Organisation of WG and Membership

### Chairpersonship

In December 2021, the group elected its new head with the Belenios online voting system. Nazim Fatès was elected as the new chair of the working group for the triennium 2022-2023-2024. Henryk Fuks and Luca Manzoni were respectively nominated as the new vice-chair and secretary.

### Events

AUTOMATA 2024 took place in Durham, England from 22 to 24 of July. It was organised by Maximilien Gadouleau (Durham Univ.) and Alonso Castillo Ramirez (Guadalajara Univ., Mexico).

This year the workshop had 25 participants. There were 4 invited speakers. Moreover, there were 14 submissions of full papers, from which 6 were accepted. In total there were 16 talks at the workshop, including the invited, contributed and exploratory talks. A wide variety of topics was covered. The atmosphere of the workshop was particularly suitable for the exchange of ideas, especially given the efforts made by the organisers to invite speakers with different topics of interest.

The working group is particularly grateful for the grant that was given to a young researcher from Algeria. Her presence at the workshop with this grant was a good opportunity for to meet the colleagues for various countries, which would have been otherwise difficult, if not impossible, without the grant.

The business meeting of the working group took place in a hybrid format. Various points were discussed, including the possibility of organising the workshop jointly with ACRI (same time and location, but keeping it as a different workshop with a different PC). The two workshops may last 5 days together instead of 3 each. It was also discussed the possibility of organising our workshop every two years, instead of every year. Each attendee expressed their opinion. The possibility of a joint organisation with ACRI was given a large support. Several opinions were also given in favour of keeping AUTOMATA as a yearly workshop. It was then decided to contact various persons for the organisation AUTOMATA 2025.

## **New members**

The following people were proposed and approved as new members:

- Kamalika Bhattacharjee, India.
- Rezki Chemlal, Algeria.
- Adrien Richard, France.
- Sara Riva, France,

## **Publications**

The LNCS proceedings were edited a few days before the workshop, see :  
<https://link.springer.com/book/10.1007/978-3-031-65887-7>.

## WG 1.06 — Rewriting

**Chair:** Dr. Cynthia Kop, Radboud University Nijmegen, The Netherlands

**Co-chair and Secretary:** Dr. Carsten Fuhs, Birkbeck, University of London, United Kingdom

**Home page:** <https://ifip-wg-rewriting.cs.ru.nl/>

### BRIEF ACTIVITY REPORT

The Working Group aims to promote research efforts in rewriting and its applications. To do this, it aims to establish a close cooperation between existing groups and to facilitate the emergence of new ones. It wants to increase awareness of rewriting techniques in the computer science community at large and foster development of applications of theoretical advances.

## Organisation of WG and Membership

The annual meeting of the IFIP WG 1.6 in 2023 was co-located with FSCD 2023 in Rome, Italy on 5 July. At this meeting, we have welcomed Thomas Genet, Temur Kutsia, and Frédéric Blanqui as new members. This meeting was held in a hybrid fashion, allowing both in-person and online participation.

Like last year, we have decided to additionally hold a fully online meeting, in August or early September. This will allow us to schedule the meeting so that members from all timezones can reasonably attend, and makes it possible to account for the planning of FSCD 2024 in our discussions regarding rewriting workshops.

The Working Group currently comprises 11 honorary members and 47 active members.

## Chairpersonship and Secretary

Cynthia Kop is the current Chair of the Working Group. Her term will end in 2024. Carsten Fuhs is the current Co-chair and Secretary of the Working Group. Like the Chair's term, his term will end in 2024.

## International School on Rewriting

The 13th *International School on Rewriting* (ISR for short) took place in the week of 19–26 September 2023, within the Computational Logic Autumn Summit in Tbilisi, Georgia. The school was organised by Besik Dundua and Temur Kutsia, and is described at: <https://viam.science.tsu.ge/clas2022/isr/>.

The 14th ISR will be organised by Aart Middeldorp in Obergurgl, Austria, from 25 August to 1 September 2024. It has three tracks:

- a basic track which introduces students to term rewriting;
- a basic track which introduces students to lambda calculus and type theory;
- an advanced track that includes topics from active research.

See the School's website for further information on the organisation of the school: <http://cl-informatik.uibk.ac.at/isr24/>

## Events organised by the Working Group

- The annual meeting of the WG in 2022 took place on 31 July 2022.
- The virtual business meeting of the WG in 2022 took place on 4 October 2022.
- The annual meeting of the WG in 2023 took place on 5 July 2023.
- The 13th ISR was held in Tbilisi in September 2022.
- The 14th ISR will be held in Obergurgl in August – September 2024.

## Forthcoming events

The next *virtual* meeting of the working group is planned for early September 2023. The next *physical* meeting is planned for July 2024, likely co-located with FSCD 2024 in Talinn, Estonia.

## **WG 1.07 — Theoretical Foundations of Security Analysis and Design**

**Chair:** Prof. Sebastian Mödersheim, Technical University of Denmark

**Vice-Chair:** Prof. Véronique Cortier, University of Nancy, France

**Secretary:** Prof. Luca Viganò, King's College London, UK

**Home page:** <http://ifipwg1-7.compute.dtu.dk>

### **BRIEF ACTIVITY REPORT**

The WG 1.7 promotes activities in the area of theoretical foundations of security analysis and design, and has been established in 1999. It mainly aims at investigating the theory of security, as well as of privacy and trust, at discovering and promoting new areas of application of theoretical techniques in computer security and at supporting the systematic use of formal techniques in the development of security related applications.

### **Organisation of WG and Membership**

Currently the WG has 26 members, from 11 countries and 3 continents:

- Europe: 18 (Germany: 5, France: 3, UK: 3, Italy: 2, Belgium, Denmark, Luxemburg, Spain, Switzerland: 1)
- America: 6 (USA)
- Australia: 2

### **Chairpersonship**

Assoc. Prof. Sebastian Mödersheim, Technical University of Denmark (DTU), elected on 27 June 2019.

### **Scientific activities and meetings**

One of the main activities in the past years was the organization of the informal workshop Hot Issues in Security Principles and Trust (HotSpot). Since there are several conferences regarding security and formal methods, we did not see the need for HotSpot in the last year. We however consider restarting it, possibly with a more specific focus.

### **Forthcoming events**

- We now plan to make a general meeting in fall with all members of the working group to discuss these collaborations and other opportunities. This will have the form of a workgroup-internal workshop, to both involve members who have not been part of any activities of the workgroup for a while and to connect existing research efforts, possibly leading to joint papers or applications for funding.
- An new edition of HotSpot, with a specific focus.

## WG 1.08 — Concurrency Theory

**Chair:** Prof. Dr. Pedro R. D’Argenio, Universidad Nacional de Córdoba & CONICET, Argentina

**Secretary:** Assoc. Prof. Dr. Ana Sokolova University of Salzburg, Austria

**Home page:** [www.concurrency-theory.org/organizations/ifip](http://www.concurrency-theory.org/organizations/ifip)

### BRIEF ACTIVITY REPORT

The aim of this working group is to develop the theoretical foundations of concurrency, exploring the frontiers of existing theoretical models such as labelled transition systems, process calculi, event structures and Petri nets, and various forms of enriched automata, so as to obtain a deeper understanding of concurrent systems and push forward the associated verification techniques.

### Organization of the WG and Membership

Currently, the WG has 52 members (12 women, 40 men). Since the WG creation in 2005, there has been a turnover of -18, +18. We have been constantly trying to improve the gender balance within the WG, both when recruiting new members and when choosing invited speakers and sending personal invitations for the events organized by the WG.

In the last business meeting, we decided to include the category of Honorary Members for members that have long served the Concurrency Theory community and the WG and have already retired from their regular jobs. In this context, we decided to accept all past member as Honorary Members. In addition, we have incorporated 1 new members and 2 of the old members ceased to be regular members and became Honorary members.

Figure A.1 reports the gender and country affiliation proportion within the WG 1.8.

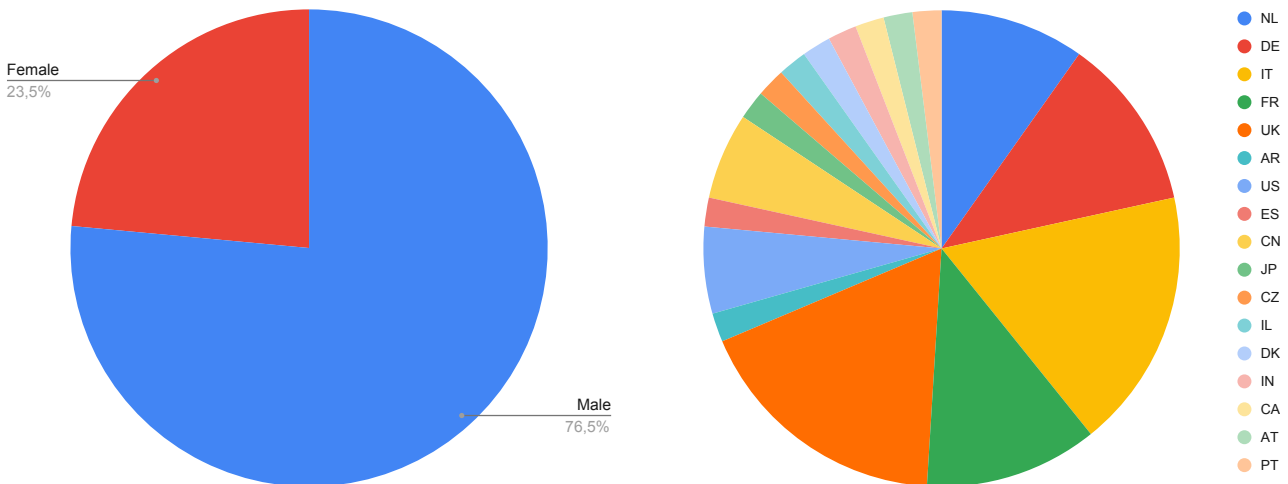


Figure A.1: Gender and Country Affiliation distribution in IFIP WG 1.8

### Chairpersonship

Prof. Pedro R. D’Argenio (UNC & CONICET, Argentina) and Dr. Ana Sokolova (University of Salzburg, Austria) started coordinating the WG 1.8 in January 2021 respectively as chairperson and secretary of the WG. A round of elections was held by the TC chair in December 2020, which led to their election. At the end of this year, a new election should be called as the three year term of office ends.

## Events organized by the WG

### 1) TRENDS (Trends in Concurrency Theory)

[See <https://concurrency-theory.org/events/trends/>.]

Since 2012, the WG organizes an annual event called TRENDS, in affiliation with the conference CONCUR (the main conference in the field). TRENDS was originally a half-day workshop, consisting of invited talks only. Since 2016, it was turned into a full-day workshop, with both invited talks and a number of “highlight talks” given by WG members or other participants. The aim of TRENDS is to stir discussion on recent trends and open problems in Concurrency Theory. It is informal, without proceedings. Editions 2020 and 2021 were held online due to the sanitary crisis. TRENDS 2022 returned to its in-person form but kept a hybrid format, so lectures were broadcasted and questions were accepted through chats. The 2022 edition consisted of only three invited talks. TRENDS 2023 was also in in/person form with 4 invited lectures.

TRENDS 2024 will take place physically next September 9, 2024, in Calgary, Canada (<https://concurrency-theory.org/events/trends/2024/>). As usual, it will be co-located with CONCUR 2024 within the umbrella event CONFEST 2024 (<https://confest2024.github.io/>). It will consist of the following three invited talks

- Clément Aubert, Augusta University, Georgia, USA
- Elli Anastasiadi, Uppsala University, Sweden
- Simone Tini, University of Insubria, Italy

### 2) OPCT (Open Problems in Concurrency Theory)

Another event that is regularly organized by the WG 1.8 is the workshop OPCT (Open Problems in Concurrency Theory), which aims at identifying the most important open problems in Concurrency Theory. This is a research seminar without proceedings, where participation is on invitation only. Its average duration is of four days, and its frequency is of one edition every 2-3 years. The four editions of OPCT took place respectively in 2014 in Bertinoro, in 2017 in Vienna, in 2019 in Lisbon, and the last one, 2023, again in Bertinoro. They have always been very successful, gathering each time an attendance of 50-60 people. See the following links:

OPCT 2014: <http://www.sti.uniurb.it/events/opct2014/>

OPCT 2017: <http://opct2017.famaf.unc.edu.ar/Home.html>

OPCT 2019: <https://popl19.sigplan.org/track/opct-2019-papers>

OPCT 2023: <http://www.sti.uniurb.it/events/opct2023/>

While OPCT is usually organized as a stand-alone event, its 2019 edition was held in affiliation with the POPL conference: <https://popl19.sigplan.org/>.

The next edition is expected to take place in 2025 or 2026. In the following weeks we will start planning this event.

### 3) TTCS (Topics in Theoretical Computer Science)

A further event that is sponsored by the WG 1.8 is the international conference on Topics in Theoretical Computer Science (TTCS), whose first two editions were held at the School of Computer Science, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, respectively in 2015 and 2017, while the third one in 2020 was held online. See the following links:

TTCS 2015: <https://doi.org/10.1007/978-3-319-28678-5>

TTCS 2017: <https://doi.org/10.1007/978-3-319-68953-1>

TTCS 2020: <https://doi.org/10.1007/978-3-030-57852-7>

## Publications

In the past, four special issues of the Journal of Logical and Algebraic Methods in Programming (JLAMP) have been organized: two of them as an outcome of OPCT 2014 and 2017, and the other two as an outcome of TRENDS 2014, 2015, and 2016:

OPCT 2014: <https://doi.org/10.1016/j.jlamp.2015.10.002>

OPCT 2017: <https://doi.org/10.1016/j.jlamp.2022.100823>

TRENDS 2014-2015: <https://doi.org/10.1016/j.jlamp.2017.01.002>

TRENDS 2015-2016: <https://doi.org/10.1016/j.jlamp.2019.07.001>

## Contribution for creating the CONCUR Test-of-Time award

[See <https://www.concurrency-theory.org/events/tot-award/>.]

Our WG contributed to the creation of a Test-of-Time award for the papers published in the CONCUR conferences. The first edition took place during CONCUR 2020 and papers for the periods 1990-1993 and 1992-1995 were awarded. The second edition took place during CONCUR 2021 and papers for the periods 1994-1997 and 1996-1999 were awarded. The third edition took place during CONCUR 2022 and papers for the periods 1998–2001 and 2000-2003. The fourth edition took place during CONCUR 2023 and a paper for the period 2002-2005 was awarded.

The fifth edition will take place during CONCUR 2024 and two complementary papers for the period 2004-2007 were awarded. The Jury of the Award for this last edition was Chaired by Frits Vaandrager and composed by Christel Baier and Luis Caires. In particular, Christel Baier is member of the WG. The selection has already been made public.

1st CONCUR ToT award: <https://concur2020.forsyte.at/test-of-time.html>

2nd CONCUR ToT award: <https://qonfest2021.lacl.fr/test-of-time.php>

3rd CONCUR ToT award: <https://concur2022.mimuw.edu.pl/tot-award/>

4th CONCUR ToT award: <https://concurrency-theory.org/events/tot-award#concur-test-of-time-awa>

5th CONCUR ToT award: [https://confest2024.github.io/CONCUR\\_awards.html](https://confest2024.github.io/CONCUR_awards.html)

## **WG 1.09/2.15 — Verified Software**

**Chair:** Prof. Jim Woodcock University of York, UK

**Secretary:** Dr. Natarajan Shankar, SRI International, US

**Past-Chair:** Dr. Jean-Christophe Filliâtre, CNRS, Orsay, France

**Home page:** <https://www.lri.fr/~filliatr/1.9/>

### BRIEF ACTIVITY REPORT

The aims of 1.9/2.15 are to contribute to a comprehensive theory of programming that covers the features needed to build practical and reliable programs; to contribute to a coherent toolset that automates the theory and scales up to the analysis of industrial-strength software; and to collect realistic, verified programs as part of the Verified Software Initiative (VSI) Repository.

Since the creation of the group in 2011, we had twelve physical meetings. These meetings are sometimes co-located with conferences of our domain (e.g. CAV, POPL) to limit travels, though this is not a rule.

We invited different observers to attend our meetings each time, and we collectively decided to elect some of them as new members whenever they participated actively and constructively in our meetings.

Our meetings encourage discussions of work in progress and leave much room for discussion. Each talk is typically given for one hour.

We also run the VSTTE conference and the Verified Software Competition (vscomp <http://vscomp.org/>), not to be confused with the VerifyThis competition, another competition of our domain).

## **Organisation of WG and Membership**

There are currently 21 members of the working group.

### **Chairpersonship**

Jim Woodcock FEng (University of York) continues to chair the working group.

### **New members**

No changes in the members during the period.

The current number of members of the group is 21 (+ 3 emeriti).

### **New organisation rules**

No changes in the organisation rules during the period.

## **Scientific activities and meetings**

### **Events organised by the Working Group**

We had no physical meetings of the working group in the period (July 2023 – July 2024). Our next physical meeting is scheduled to take place at the ISoLA and AISoLA conference 27–31 October 2024.

## WG 1.10 – String Algorithmics & Applications

**Chair:** Prof. Jan Holub, Czech Technical University in Prague, Prague, Czech Republic

**Home page:** <http://www.stringology.org/ifip/>

### BRIEF ACTIVITY REPORT

The WG 1.10 aims to promote research in String Algorithmics (combinatorics on words, string algorithms) and applications. It proposes a unique forum for the best available research that will provide sustained inspiration within the stringological community for still better research. We intend to take advantage of the applied nature of a very theoretical topic to encourage both theory and practice in the group. At both ends our main concern is to promote relevant research of the very highest quality.

The scope the group is paradoxically both well-focussed and broad: well-focussed because the underlying combinatorial object is text, a simple word, a piece of string; broad because of the numerous applications (combinatorics on words, finite automata), but also algorithms on strings, and so the application areas for those algorithms, of which a partial list follows:

- computational biology (including system biology, biology/PPI networks),
- text compression,
- natural language processing,
- information retrieval, both on and off the Internet (including search engines, massive indexing applications),
- data mining,
- pattern recognition,
- software engineering,
- cryptology,
- computational geometry,
- computational musicology.

## Organisation of WG and Membership

### Chairpersonship

Jan Holub is a chair of WG since 2019 when the WG was re-established.

### New members

No changes in the members during the period.

### New organisation rules

No changes in the organisation rules during the period.

## Events organised by the Working Group

- 26th Prague Stringology Conference (PSC 2023). Prague, Czech Republic, August 28–29, 2023,
- 30th International Symposium on String Processing and Information Retrieval (SPIRE 2023). Pisa, Italy, November 26–28, 2023,
- 35th Annual Symposium on Combinatorial Pattern Matching (CPM 2024). Fukuoka, Japan, June 25–27, 2024,

## Forthcoming events

- 27th Prague Stringology Conference (PSC 2024). Prague, Czech Republic, August 26–27, 2024,
- 31st International Symposium on String Processing and Information Retrieval (SPIRE 2024). Puerto Vallarta, Jalisco, México, September 23-25, 2024.
- 36th Annual Symposium on Combinatorial Pattern Matching (CPM 2025).

## WG 1.11/2.17

**Chair:** Prof. Ina Schaefer, Karlsruhe Institute of Technology, Germany

**Secretary:** Prof. Tobias Osborne, University of Hanover, Germany

**Home page:** [el.kit.edu/english/activities/IFIP\\_Working\\_Group\\_on\\_Foundations\\_of\\_Quantum\\_Computation.php](http://el.kit.edu/english/activities/IFIP_Working_Group_on_Foundations_of_Quantum_Computation.php)

### BRIEF ACTIVITY REPORT

Arguably quantum computing is coming of age. With the race for quantum rising between major IT players, and the announcement of new prototype, proof-of-concept machines, it seems we are in the verge of a real shift. For the first time the viability of quantum computing may be demonstrated in a number of real problems extremely difficult to handle, if possible at all, classically, and its utility discussed across industries. In a sense, Feynman's dream of letting Nature, suitably engineered, compute for us through its own natural quantum behaviour, seems to be closer, even if the project of a universal quantum computer still has a long way to go. In the somehow emphatic language of the media, a "second quantum revolution" is quickly approaching. It is characterised by the ability to harness weird quantum phenomena, namely superposition, interference and entanglement, as computational resources, with practical advantage. In this move the role of software, and its foundations and engineering, cannot be underestimated.

The conceptualisation of quantum computing predated its technological realisation: in a way physicists are making it happen. Similarly, in the 1930's, Turing machines anticipated digital computers. It seems history is repeating itself. Differently, however, from what happened before, we have now the chance to get theory in place before technologies emerge and popularise. IFIP cannot be strange to this challenge.

Such is the aim of this new Working Group. Operating under both TC1 and TC2, it will be oriented towards the development of foundations and rigorous, mathematical methods for Quantum Computer Science, including the theory and methods of quantum information science, quantum computation and quantum software engineering, and its application to strategic, emerging problem-areas. Furthermore, fulfilling its mandate as an IFIP technical asset, the new WG will contribute to the scientific and technical development of this new dimension of Computer Science.

### Main Research Topics

- Quantum Algorithms
- Quantum Programming Languages and Compilation
- Quantum Foundations
- Formal Methods for quantum computing

## Organisation of WG and Membership

### Chairpersonship

*Prof. Ina Schaefer*, Karlsruhe Institute of Technology, Germany

Elected in the first in-person business meeting, 24 July, 2023. *Prof. Tobias Osborne* was chosen as WG 1.11 Secretary in the same meeting.

## **Scientific activities and meetings**

### **Formal meetings of the Working Group**

The WG 2024 meeting will take place in October, in München.

### **Remarks**

The Working Group is still in its start-up phase. Ina Schaefer and Tobias Osborne are Acting Chair and Acting Secretary, respectively. A (“proper”) Chair and Secretary have to be elected at the next WG meeting in October 2024. The membership list is also still under construction. The group is still wants to add more members to create a broader spectrum of perspectives and research areas in the foundations of quantum computing before transitioning to the observer model after the meeting in late-2024.