A Short History of TACAS

1. Introduction

The International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) is celebrating its 25th anniversary later this year. As three of the original co-founders of the meeting, we are proud of this milestone, and also a bit surprised by it! Back in the 1993-1994 timeframe, when we were formulating plans for TACAS, we had no other aspirations than to have an interesting, well-run event interested in the theory and practice of analysis and verification tools. That said, we feel something of an obligation to record the course TACAS has followed over the years. That is the purpose of this note: to give a brief history of the conference, and to highlight some of the decisions that were made as it evolved.

2. Pre-History

The idea for TACAS was hatched on a tennis court in Elounda, Greece, during the 1993 Computer-Aided Verification (CAV) conference. CAV was a relatively young meeting at the time in a field (automated verification) that was experiencing explosive growth. The three of us were playing doubles with another CAV attendee, Ed Brinksma; the four of us would go on to be the founding members of the TACAS Steering Committee. Immediately after the match we fell to talking about CAV, how great it was to have a conference devoted to verification, but how some topics, especially ones devoted to software, and to system analysis and not necessarily verification, were not on the table. This conversation turned to what another meeting might look like, and thus was the seed for what became TACAS, an event addressing tools for the construction and analysis of systems. (Perhaps interestingly, our original idea of a name for the conference was Tools, Algorithms and Methodologies – TAM. We decided to drop 'methodologies' from the title in order to clearly emphasize the tool aspect.)

In subsequent meetings and e-mail exchanges we fleshed out the idea of the conference. We wanted to support papers about tools on equal footing with typical research papers and to further increase the awareness of tools by making case studies and tool demonstrations part of the main conference with dedicated topical parts. At the time, other conferences we were familiar with did not have demos, or if they did, they took place during breaks and social events, meaning the audiences were small.

By scheduling demos during regular conference sessions, we were able to ensure good attendance, and by providing the typical 15 pages for (regular) tool papers and case study papers, and 4 pages for tool-demo papers, we also gave tool builders an opportunity to present their tool and give something cite-able for others who wanted to reference the work. In fact, the most highly cited TACAS paper of all time is the 2008 tool-demo paper for the Z3 SMT solver by Leonardo de Mourna and Nikolaj Bjørner, whose citation count just passed 5000.

3. The Early Years

TACAS began its life as a workshop, rather than a conference, although all its proceedings were published by Springer in its Lecture Notes in Computer Science series.

The first meeting of TACAS took place May 19-20, 1995, in Aarhus, Denmark as a workshop to the TAPSOFT conference series. Both TAPSOFT and our TACAS workshop were hosted by the prominent BRICS research center. The workshop featured 13 accepted papers and Springer published the proceedings in its Lecture Notes in Computer Science (LNCS) series. The program committee was chaired by the four Steering Committee members (the three of us, plus Ed Brinksma) and Tiziana Margaria.

The next meeting, March 27-29, 1996, in Passau, Germany featured 30 papers (including 11 tool-demo papers) and lasted three days, rather than two.

The final workshop instance of TACAS occurred in Enschede, Netherlands on April 2-4, 1997, and had 28 papers.

4. ETAPS

In 1994 during a TAPSOFT business meeting in Aarhus negotiations began to integrate several European software-focused conferences into a consortium of co-located meetings. The resulting amalgam was christened the Joint European Conferences on Theory and Practice of Software (ETAPS), and has become a prominent meeting in early spring in Europe since its initial iteration in 1998.

TACAS had been a workshop until 1997, but starting in 1998 it became a conference and was one of the five founding conferences of ETAPS, along with the European Symposium on Programming (ESOP), Foundations of Software Systems and Computational Structures (FoSSaCS), Fundamental Aspects of Software Engineering (FASE), and Compiler Construction (CC). This step in TACAS' development helped cement its status as a premiere venue for system analysis and verification tools, although the increased overhead associated with coordinating its activities with four other conferences presented challenges. The increased exposure, however, did lead to significant increases of submissions and also in accepted papers. In 1998, the first iteration of ETAPS was held in Lisbon, Portugal; the TACAS program featured 29 presentations. Figure 2 shows a goup of people during the 10 years of TACAS celebration in 2004. By the 2007, or 10th, incarnation of ETAPS, which was held in Braga, Portugal, the program featured 57 presentations (several of these were invited contributions, while others were tool-demo papers). Negotiating this increased presence of TACAS within ETAPS required tact and diplomacy, and it is a testament to the bona fides of both the TACAS and ETAPS organizers that this was achievable.

As part of becoming a conference and a part of ETAPS, TACAS also institutionalized some of the informal practices that it had used in its early, workshop-based existence. The Steering Committee structure was formalized, with the three of us and Ed Brinksma becoming the official members. (After several years of service, Ed Brinksma left the Steering Committee to pursue leadership positions in Dutch and, subsequently, German universities and re-



Fig. 1. 10 years of TACAS celebration in 2004 in Barcelona, Spain. From left to right: Andreas Podelski, Joost-Pieter Katoen, Lenore Zuck, Bernhard Steffen, Tiziana Margaria, Ed Brinksma, Hubert Garavel, Susanne Graf, Kim Larsen, Nicolas Halbwachs, Wang Yi, and John Hatcliff

search institutions. Joost-Pieter Katoen took Brinksma's place; when he then left to assume leadership of ETAPS, Holger Hermanns ascended to the TACAS Steering Committee. Lenore Zuck and, currently, Dirk Beyer have also held ad hoc positions on the Steering Committee.)

The conference also standardized its approach to program-committee leadership, with two co-chairs being selected each year, and with a dedicated tool chair for overseeing tool submissions and demonstractions. Today, similar committee structures can be found at other conferences as well, but they were less common when TACAS adopted it.

5. Subsequent Developments

Since joining ETAPS, TACAS has experimented with its programmatic aspects. In recent years, the conference has started to increase the emphasis of the four paper categories by explicitly providing four categories of paper submission: regular, tool, case study, and demo. Starting in 2012, it also started to include tool competitions, most notably SVCOMP led by Dirk Beyer, which have proved popular with the community and have attracted increasing numbers of competitors. The conference has also modified its submission and reviewing processes over the years.



Fig. 2. Most Influencial Paper Award Ceremony at the 20 Years of TACAS celebration in 2014. From left to right Rance Cleaveland, Bernhard Steffen, Armin Biere, Alessandro Cimatti, Leonardo de Mourna, Holger Hermanns, and Kim Larsen

At ETAPS 2014 in Grenoble we celebrated the 20th anniversary of TACAS. During this celebration, awards for the most influential papers in the first 20 years of TACAS were given. The regular-paper category went to Armin Biere, Alessandro Cimatti, Edmund Clarke, and Yunshan Zhu for their 1999 paper "Symbolic Model Checking without BDDs", and the tool-demo category went to the "Z3: An Efficient SMT Solver" presented by Leonardo de Mourna and Nikolaj Bjørner in 2008. Figure 2 shows Armin Biere, Alessandro Cimatti, and Leonardo de Mourna during the award ceremony.

6. Reflections

As we noted at the beginning of this paper, we had no idea when we started TACAS in 1995 that it would become the venue that it is 25 years later. Most of the credit should go to the authors who submitted their work to the conference, to the hard work of the program-committee chairs and members who reviewed and selected papers for presentation at the conference, to the tool-demo chairs who oversaw the selection of tool demonstrations, and to the local-arrangements organizers who ensured the technical infrastructure at conference venues could handle the requirements of tool demonstrators.

That said, we do think that some of the organizational strategies adopted by TACAS have helped its success as well. Here we comment on a few of these.

- Compact Steering Committee. The TACAS Steering Committee has always had 4-5 members. This is in contrast to other conferences, which may have 10 or more members. The small size of the TACAS committee has enabled greater participation on the part of the individual members.
- Steering Committee \subseteq Program Committee. Unusually, and because the steering committee is small in number, steering-committee members serve on the program committee each year. This has sometimes been controversial, but it does ensure institutional memory on the PC so that decisions made one year (about the definition of double-submission, for instance) can be recalled in later years.
- PC Co-Chairs. As mentioned earlier, TACAS has two people leading the program committee, as well as a tool chair. Originally, this decision was based on the fact that, because TACAS had multiple submission tracks (regular, tool, case study, and tool demo), the PC chairing responsibilities were more complex. Subsequently, though, our observation is that having two leaders can lead to load-sharing and also good decision-making. This is particularly fruitful for dealing with conflicts, as one chair can oversee the papers where the other has a conflict.

This LNCS volume is devoted to the TACAS 25th anniversary event, TOOLympics, which comprises contributions from 16 tool competitions. The maturity of these challenges, as well of the participating tools impressively demonstrates the progress which has been achieved in the last 25 years. Back in '94 we would never have imagined the power of today's tools with SAT solvers capable of dealing with hundreds of thousands of variables, powerful SMT solvers, and complex verifications tools that make careful use of the power of these solvers. The progress is really impressive, as is still the gap towards true program verification of industrial scale. This requires a better understanding of the developed methods, algorithms, and technologies, the impact of particular heuristics, and, in particular, the interdependencies between them. TOOLympics aims at fostering the required interdisciplinary, problem-oriented cooperation, and as the founders of TACAS, we are looking forward to observe the results of this cooperation in forthcoming editions of TACAS.

Finally, we would like to thank Alfred Hofmann and his Springer team for the continuous support in particular during the early phases. Without this support, TACAS would never have developed in the way it did.

February 24, 2019 Alexandria Aalborg Dortmund

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