2021 Edsger W. Dijkstra Prize in Distributed Computing

The Edsger W. Dijkstra Prize in Distributed Computing is awarded for outstanding papers on the principles of distributed computing, whose significance and impact on the theory or practice of distributed computing have been evident for at least a decade. It is sponsored jointly by the EATCS Symposium on Distributed Computing (DISC) and the ACM Symposium on Principles of Distributed Computing (PODC). The prize is presented annually, with the presentation taking place alternately at DISC and PODC. The committee decided to award the 2021 Edsger W. Dijkstra Prize in Distributed Computing to

- **Paris C. Kanellakis** and **Scott A. Smolka**

for their paper:

- CCS Expressions, Finite State Processes, and Three Problems of Equivalence, *Information and Computation*, Volume 86, Issue 1, pages 43—68, 1990.

A preliminary version of this paper appeared in the *Proceedings of the Second Annual ACM Symposium on Principles of Distributed Computing (PODC 1983)*, pages 228—240.

This paper was a foundational contribution to the fundamental challenge of assigning semantics to concurrent processes, for specification and verification. It addressed the computational complexity of the previously introduced celebrated notion of behavioral equivalence, a cornerstone of Milner's Calculus of Communicating Systems (CCS), aimed at tackling semantics by considering equivalence classes.

With the publication of their PODC 1983 paper, Kanellakis and Smolka pioneered the development of efficient algorithms for deciding behavioral equivalence of concurrent and distributed processes, especially bisimulation equivalence, which is the cornerstone of the process-algebraic approach to modeling and verifying concurrent and distributed systems. Specifically, the main result of their paper is what has come to be known as the K-S Relational Coarsest Partitioning

algorithm, which at the time was a new combinatorial problem of independent interest.

The paper also presented complexity results that showed certain behavioral equivalences are computationally intractable. Collectively, Kanellakis and Smolka's results founded the subdiscipline of algorithmic process theory, and helped jump-start the field of Formal Verification.

The 2021 Edsger W. Dijkstra Prize Award Committee:

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- David Peleg, Weizmann Institute of Science

The list of the previous recipients of the Edsger W. Dijkstra Prize in Distributed Computing is available at `https://www.podc.org/dijkstra/`.