

IN MEMORIAM

LARS ARGE

* 8.10.1967 — † 23.12.2020

Our dear colleague and friend Lars Arge passed away on December 23, 2020, at the age of 53, way too early. Lars was battling kidney cancer the last years of his life, something he was very open about on social media and in personal communications, where Lars took a very scientific approach to understanding the disease and the possible treatments. Lars was a graduate of Aarhus University. He made a carrier at Duke University in the US, before returning to Aarhus University as a full professor, a position he held when he died.

Lars was born and grew up in Ebeltoft 30 km east of Aarhus. In 1986, at the age of 18 he moved to Aarhus to study Computer Science with a minor in Physics. During his studies Lars got deeply involved in student politics and became the chairman of the Student Council “Studenterrådet” at Aarhus University for a couple of years. University politics continued to have Lars’ attention throughout his career. During the later stages of his career, he got into positions where he could influence the national research agenda in Denmark.

During his MSc studies in computer science, Lars got the opportunity to enroll in the newly established "4 + 4" PhD program at Aarhus University, allowing students to start on a four year PhD after four years of full time university studies. In Lars’ case, "4 + 4" nearly became 10 years of study at Aarhus University, before graduating with a PhD from the Department of Computer Science at Aarhus University and as the third graduate from the research center BRICS (Basic Research in Computer Science). The title of his PhD thesis was "Efficient External-Memory Data Structures and Applications" — a title that also embraces most of Lars’ research after his PhD. A central part of his thesis was his WADS 1995 paper "The buffer tree: A new technique for optimal I/O-algorithms", that was published in *Algorithmica* in 2003. It would become Lars’ only single-authored journal publication. Lars published +100 peer reviewed conference and journal publications, but only two were single-authored and both published during his PhD. Central to Lars’ research and research leadership became the collaboration between researchers.



Lars Arge (Photo: Morten Koldby)

During his PhD studies, Lars was a visiting scholar at Duke University in the US for eight months, visiting Jeffrey Scott Vitter, a stay that shaped his view of university education. Lars wrote in the acknowledgments of his thesis "The stay at Duke meant everything to me". As history showed he was not done with Duke. After his thesis defense Lars returned to Duke for a postdoc in 1996 with Jeffrey Scott Vitter and Pankaj K. Agarwal, and then he accepted a tenure-track faculty position at Duke, after having interviewed across North America. Lars was awarded tenure at Duke and promoted to full professor. While at Duke he established intense research collaborations with Pankaj K. Agarwal and Jeffrey Scott Vitter that over the years have resulted in 44 joint publications, centered around massive data algorithms, spatial databases, GIS, and computational geometry. After returning to Denmark, Lars kept his connection to Duke University as an Adjunct Professor for many years, and many of the PhD students under the supervision of Lars at Aarhus University did their stay abroad at Duke University.

Lars returned to Aarhus University in 2004 where he was funded an Ole Rømer Scholarship from the Danish National Science Research Council — funding allowing Lars to establish a research group at Aarhus University in external memory algorithms and data algorithms. Shortly after Lars returned to Aarhus University, he moved on to make his big coup: In 2006, he was awarded a grant from the Danish National Research Foundation to establish a Center of Excellence called MADALGO, Center for Massive Data Algorithmics. As a novelty, Lars asked the Foundation to support research activities outside Denmark, to formally establish international collaboration with Ulrich Meyer and Kurt Mehlhorn at the Max-Planck-Institute for Computer Science in Saarbrücken, Germany, and with Erik D.

Demaine and Piotr Indyk at MIT, Boston, USA. Over the next 10 years the foundation supported the center by 70 million DKK, enabling a high level of activity in the area of external memory algorithms. Central activity of the center covered educating many PhD students, hosting post docs, having many short and long term guests, arranging yearly summer schools, organizing the yearly MASSIVE workshop (that was co-located with SoCG and ALGO) during the life of the center, and hosting two major algorithm conferences: The 25th Annual Symposium on Computational Geometry in 2009 and the annual ALGO meeting (consisting of the premier algorithmic conference European Symposium on Algorithms and affiliated workshops) in 2016. With MADALGO Lars established a platform where he could bring many young and established researchers together — a true visionary research leader. The success of MADALGO was confirmed by an international evaluation panel that concluded "no doubt (is) the world-leading center in massive dataset algorithmics".

Lars' research was founded on basic research on external memory algorithms and data structures. But Lars also had a focus on showing the practical relevance of his theoretical research. He published experimental algorithms work e.g. at ALENEX (Workshop on Algorithm Engineering and Experiments) and in JEA (ACM Journal of Experimental Algorithmics). He had extensive collaboration on topics in biodiversity with biologist Jens-Christian Svenning at Aarhus University with whom Lars had joint post docs and PhD student advising. Lars' extensive work over the years on external memory algorithms for terrain modeling was transformed into the startup company SCALGO, that Lars founded in 2009 together with his PhD students Morten Revsbæk and Thomas Mølhave, and Pankaj K. Agarwal from Duke University, with the goal commercializing I/O efficient algorithms for processing terrain data. Several of Lars' PhD students have joined SCALGO after graduation.

Lars was an enthusiastic teacher and advisor for many students. Both at Duke and Aarhus University he taught a variety of algorithms courses. At Aarhus University, every year he taught "his" graduate I/O-algorithms course. He did several public science lectures in Denmark and was a frequent invited speaker at international conferences. In 2016 he e.g. gave a public lecture at The Royal Danish Academy of Science and Letters in Copenhagen on "Effective Big Data algorithms and Flood Risk Assessment", a lecture that is available on YouTube (in Danish).

Lars was the PC chair (or co-chair) of SWAT 2006, ICALP 2007, ESA 2007, and SoCG 2015; he served on the steering committees of ALENEX, ESA and SWAT; and he was an editor or guest editor on many journals, including JEA and Algorithmica.

Lars' contributions to research earned him several awards. He became an ACM Distinguished Scientist in 2009 and a Fellow of ACM in 2012 for his contributions to massive data algorithmics. In 2010 he was the first computer sci-

entist to receive the Danish Minister of Research Elite Research award, and in 2016 he became an Honorary Doctorate at TU Eindhoven, the Netherlands. For his groundbreaking research contributions, Lars was knighted by the Queen of Denmark in 2015.

During the MADALGO years Lars became very actively involved in national research politics. He became an Elected Member of the Royal Danish Academy of Sciences and Letters in 2008, and of the Danish Academy of Technical Sciences in 2011. In 2013 he became a member of the Natural Science Council of Independent Research Fund Denmark, where he was vice-chair in 2015–2017 and chair 2017–2019. His active work in the Royal Danish Academy of Sciences and Letters earned him a position in its Presidium in 2015. In 2016 he became its Secretary General — a role giving him unique experiences, like hosting Steve Hawkins in the Academy in 2016 and the Queen of Denmark at the celebration of the Academy's 275 anniversary in 2017. Lars used his position to make the national leaders aware of the importance of basic research and computer science, and he championed the introduction of the tenure-track system in Denmark to establish a clearer career track for young researchers and for attracting strong young researchers from abroad.

Lars cared deeply about his colleagues, students, family and friends. If you had a problem, big or small, you could always go to Lars to get advice. Lars was always pleasant to be around with and was open to everybody from students to top researchers. You could have a political discussion with him over a beer, join him for a soccer match at the stadium in Aarhus with his local team, join him for a fun party (like the Danish Christmas lunches at the department or with the MADALGO research group), or go go-carting with him (if you were in doubt if Lars was competitive, you would soon realize this when Lars tried to bypass you, as many MADALGO visitors experienced over time).

In summary, Lars was a dedicated excellent researcher whose research was spanning from pure theoretical to experimental computer science, an interdisciplinary researcher, a successful entrepreneur, an inspiring teacher and a visionary research leader. But, above all, a great guy to have around you.

Lars, you will be missed!

Gerth Stølting Brodal