Editors' Preface

Adriaan van Wijngaarden, mathematician and computer scientist, was born in Rotterdam, November 2, 1916. He was educated at the Gymnasium Erasmianum in Rotterdam, and studied at the Delft Technological University, where he obtained his Ph.D. in Mechanical Engineering in 1945. The title of his thesis was 'Some applications of Fourier integrals to elastic problems'. His first positions were with the Delft Technological University – during the war years – and, during 1946, with the National Aerospace Laboratory.

In February 1946, the Mathematisch Centrum (MC) was founded in Amsterdam as a research institute in pure and applied mathematics by a number of far-sighted scientists who foresaw the importance of mathematics for the Dutch post-war society. On January 1, 1947, Van Wijngaarden started his work at the MC as founder of its Department of Computation. It was the beginning of his eminent career at our Institute. In the ensuing years, the MC grew from a handful of people to a staff or more than 150 employees. Moreover, computer science in the Netherlands was born, grew up and came of age, all due to the inspiring leadership and great scientific achievements of Van Wijngaarden.

We shall try to briefly outline the main events of Van Wijngaarden's years at the Mathematisch Centrum. Immediately after his appointment he left for an extensive tour – taking most of 1947 – of the UK and the USA. He visited many of the places and people involved in the fascinating development of the first computers and their applications, including Wilkes in Cambridge, Turing and Wilkinson at the National Physical Laboratory, and Goldstine and Von Neumann at the Institute for Advanced Study. Then, upon his return to Holland, Van Wijngaarden initiated the work on the construction of the first Dutch computers. In the early fifties, primarily at the Mathematisch Centrum and, later, also in a number of industrial laboratories, the first electronic computers of the

Netherlands were built. The ARRA was completed at the MC in 1952, and was one of the first machines on the continent. Members of the group headed by Van Wijngaarden were B.J. Loopstra and C.S. Scholten, G.A. Blaauw for a somewhat shorter period, and, at a later stage E.W. Dijkstra and W.L. van der Poel. The latter was employed at that time by the Dutch PTT Laboratory, but worked in close contact with the MC and was actually Van Wijngaarden's first Ph.D. student. (See also the list of Van Wijngaarden's Ph.D. students below.) After the ARRA, the MC constructed the ARMAC and the X1, the first fully transistorized machine. In the late fifties, it was felt that further manufacturing of computers was more appropriate in an industrial environment, rather than in a research institute, and the Electrologica company was founded as an independent firm for this purpose. Later, Electrologica was to become part of the Philips concern.

In the years of his involvement in the development of Dutch computers, Van Wijngaarden also worked very actively as a mathematician, publishing numerous papers on a variety of topics in applied and numerical mathematics, and a few in number theory as well. In fact, the first published algorithm in ALGOL 60 (the procedure *euler* of the Report on the Algorithmic Language ALGOL 60, cf. Peter Naur's invited lecture in these Proceedings) was based on Van Wijngaarden's publication [17] (see the list of publications to follow), one of his main contributions to numerical mathematics.

In the meantime, the importance of Van Wijngaarden's work was recognized by the Dutch scientific community in a number of ways. In 1952, he was appointed 'Bijzonder hoogleraar' at the University of Amsterdam. (This is a part-time appointment with the rank of full professor, financed, e.g., by a research foundation.) In the same year, he became a member of the Board of the Mathematisch Centrum. In 1958 he was appointed as 'Buitengewoon hoogleraar' at the University of Amsterdam (the difference with 'Bijzonder hoogleraar' being that the position is paid by the university) to teach Applied Mathematics. In 1959 he was elected member of the Koninklijke Nederlandse Akademie van Wetenschappen (the Royal Dutch Academy of Sciences), and he also received the 'Medaille d'argent de la ville de Paris'. In 1960 he was elected as a Senior Member of the Institute of Radio Engineers (now IEEE).

In the late fifties – after the termination of the MC's involvement in the construction of computers – Van Wijngaarden's scientific interest

changed direction, and turned to the design of machine independent, general purpose algorithmic languages. It is in this area that the contributions of Van Wijngaarden have probably been the most profound. For this reason, the organizers of the Symposium have selected the theme Algorithmic Languages as an appropriate topic for a conference in his honour. We are very glad that these proceedings contain the excellent papers by Peter Naur and Władysław Turski describing Van Wijngaarden's share in the design of ALGOL 60, and his monumental efforts in the design of ALGOL 68. ALGOL 68 being essentially an IFIP project, it is only to be expected that in Professor Zemanek's impressive address on Van Wijngarden's role in the history of IFIP, a major part is played by the ALGOL 68 developments. The final judgement on Van Wijngaarden's work on algorithmic languages is in the hands of history. The editors cannot but admire its mathematical depth, conceptual richness and elegance, and sheer intellectual power, recognize its lasting influence on the theory and teaching of programming languages, and, at the same time, admit that the complete implementation of ALGOL 68 has posed serious problems, and its practical use has spread little outside the academic world.

In 1961, Van Wijngaarden was appointed director of the Mathematisch Centrum. Besides the demands of his scientific work, he now also carried the responsibility for our Institute – helped by the associate directors F.J.M. Barning and, later, J. Nuis. We feel that it has been a privilege for us to be led by a great scientist. The example he has set us by his outstanding research, his love for mathematics in general – and for the Mathematisch Centrum in particular –, and the way in which he has represented our Institute in national and international bodies concerned with the organization of scientific work have been vital for the MC, and, through this, for the whole Dutch mathematical community. Internationally, most of Van Wijngaarden's organizational contributions have been through IFIP, and we are grateful to Professor Zemanek for his splendid *laudatio* of Van Wijngaarden's IFIP work. In the Netherlands, Van Wijngaarden has been involved in so many organizations that we cannot begin to describe his contributions in full. He was founder and for many years member of the Board of the Nederlands Rekenmachine Genootschap, i.e., the Dutch Computer Society, which appointed him an honoary member in 1972. He was a member of the Board of the Wiskundig Genootschap (the Dutch Mathematical Society), and for many years chairman of its Committee for Scientific Computing. For many years, again, he was chairman of the

Academische Raad Sectie Informatica (the committee coordinating university education in computer science in the Netherlands). He was one of the founders of SARA, the joint computer centre of the Mathematisch Centrum, the University of Amsterdam and the Free University at Amsterdam. And, to close this very incomplete list with an activity which has always been precious to Van Wijngaarden: through the years he has taken a lively interest in computational linguistics, exemplified here by his membership of the committee for Frequency Investigations of the Dutch Language.

For almost thirty years now Van Wijngaarden has been a Professor of Applied Mathematics at the University of Amsterdam. During those years his teaching covered a wide spectrum of topics ranging from, e.g., numerical mathematics through the design and application of ALGOL 60 and ALGOL 68 to the art of two-level grammars. Numerous students have received their first introduction to computer programming through his lectures. The quest for elegance has always been one of Van Wijngaarden's driving forces, and often his audience marveled at the crystal beauty of the algorithms he taught them. Present day teaching of computer science in the Netherlands owes an immense debt to Van Wijngaarden. Virtually all Dutch professors of computer science were either his Ph.D. students (see list below), or spent some years at the Mathematisch Centrum, profiting from its stimulating research conditions. Besides his lectures at the Amsterdam University, Van Wijngaarden has given innumerable lectures in the Netherlands and abroad. Some impression of the scope of his travelling can be obtained by Professor Zemanek's listing of his participation in IFIP meetings. The full list of all his trips extends over ten pages. It includes prolonged stays as visiting professor at New York University, the University of California at Berkeley, and the University of Chicago. Further many invited lectures at important conferences – at the IFIP Congress 68 on ALGOL 68, to mention just one example –, special honours such as the first Fibonacci lecture in Pisa, 1967, and countless talks at universities around the world.

The importance of Van Wijngaarden's work for the Dutch society in general was recognized by his being honoured in 1973 as Ridder in de Orde van de Nederlandse Leeuw (one of the orders in the Queen's list of honours). In 1974, his international work was honoured by the International Federation for Information Processing which awarded him its Silver Core. In 1978, he was awarded an honorary doctorate by the Institut National Polytechnique in Grenoble.

Having started our brief description of Van Wijngaarden's scientific career with mentioning his Ph.D. at the Delft Technological University, we now come to a very appropriate ending: In 1979, Van Wijngaarden was awarded the Doctorate Honoris Causa by the Delft Technological University. W.L. van der Poel, his first Ph.D. student, was now his *promotor*.

On September 1, 1980, Van Wijngaarden retired as director of the Mathematisch Centrum, and became advisor to the Board of Trustees and the Directorate of our Institute. His complete retirement from the MC will take place in the fall of 1981. We know that the last years have been hard for him, due to the untimely death of his beloved wife Willeke. She is remembered in sorrow by countless friends and colleagues of Van Wijngaarden.

Algorithmic – and other – languages continue to be central interests of Van Wijngaarden's scientific life. 'Languageless programming' is the intriguing title of his latest publication, and he remains enticed by the charms of etymology; we are eagerly looking forward to the results of his further studies.

Having reached the end of our Preface, we express our deepest gratitude for everything done for our Institute and for the world of science by Adriaan van Wijngaarden, Dutch mathematician and computer scientist.

The Editors