

# In Memoriam A. van Wijngaarden

## Director Mathematical Centre 1961-1980

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On February 7th 1987, Prof. A. van Wijngaarden passed away. Practically since its foundation Van Wijngaarden had been connected with the MC, first as head of the Computing Department, from 1961 till 1980 as director, and after that for another year as advisor to the Board of Trustees and Board of Directors. During these 35 years he determined to a high extent the image of the MC. A pioneer in computer science with his roots in (numerical) mathematics, he also embodied one of the principles on which the MC has always set great store: mathematics going hand in hand with computer science. But also outside the MC, which during these years grew from a handful of people into an institute with well over 150 employees, Van Wijngaarden put his stamp on a number of developments. The birth of computer science in the Netherlands, and its development into a fully-grown discipline, is due for an important part to him. Internationally, his contribution to the development of the programming languages ALGOL 60 and ALGOL 68, and his role in such organisations as IFIP, have been of lasting significance.

Van Wijngaarden was born in Rotterdam on November 2nd, 1916. He studied mechanical engineering at the Technical University of Delft where he took his doctor's degree in 1945 on a thesis entitled 'Some Applications of Fourier Integrals to Problems of Elasticity'. Before he joined the Mathematical Centre on January 1st, 1947, he had held positions at the Technical University of Delft and at the National Aviation Laboratory (NLL). Immediately after his appointment as head of the nascent Computing Department, Van Wijngaarden went on a prolonged fact-finding mission to England and the U.S.A. in order to orientate himself about the newly developed electronic computer, and its use. In the course of this trip he came into contact with such computer pioneers as Wilkes, Turing, Wilkinson, Goldstine and Von Neumann. Upon his return, one of his conclusions was that the MC would do best to design and construct itself a computer. In 1952, under the leadership of Van Wijngaarden, the ARRA (Automatische Relais-Rekenmachine Amsterdam) — the first electronic computer machine in the Netherlands and one of the first on the continent of Europe — was completed at the MC. Members of the development team were B.J. Loopstra and C.S. Scholten, for a shorter period G.A. Blaauw, and at a later stage E.W. Dijkstra and W.L. van der Poel. The latter was at that moment employed by the Laboratory of the PTT (Post and Telecommunications Office), but worked in close collaboration with the

MC. Of the total of five computers which the Netherlands had in 1955, three (ARRA, FERTA and ARMAC) had been built under Van Wijngaarden's leadership at the MC, while the constructor of PTERA of the PTT — Van der Poel — was his first Ph.D. student, and later conferred Van Wijngaarden's own honorary doctor's degree at the Delft Technical University. (The fifth machine was a Ferranti computer at Shell.) In 1959 commercial interest for computer construction led, in cooperation with the life insurance company Nillmij, to the founding of an independent company: Electrologica (later incorporated in Philips Data Systems).

In the meantime Van Wijngaarden had already actually build up a computing service, which under his direct leadership — each morning he gave the 'calculator girls' a one hour lesson, and he was personally involved in setting up the calculation schemes — contributed considerably to the realisation of the goals of the MC. In this way, in a contract for the NLL, for those days difficult and extensive calculations were made of the vibration (flutter) of aeroplane wings in subsonic streams.

During these 'calculating years' Van Wijngaarden was also active as a mathematician. He published many articles on various subjects in applied and numerical mathematics, and some in the area of the theory of numbers. His name lives on for numerical mathematicians in the Van Wijngaarden Transformation. Appreciation for his scientific work followed quickly: in 1952 Van Wijngaarden became 'special professor' at the University of Amsterdam and in 1958 'professor extraordinary' in a chair on 'Numerical Mathematics and Computer Methodology'. In 1959 he was elected to the Royal Dutch Academy of Sciences. Many of his pupils have leading functions in research and industry. At the moment 10 of his 15 former Ph.D. students hold themselves a professorship.

Already in the period when he was involved in the construction of computers, but even more after the actual production process had been passed on to commercial interests, Van Wijngaarden's scientific interest focussed on the mathematics of programming. Together with his co-worker E.W. Dijkstra he made essential contributions to the development of ALGOL 60 and he was the great pioneer of ALGOL 68. The contribution of each of the four authors of the ALGOL 68 report were characterized concisely by Van Wijngaarden as follows: 'Koster: transputer; Peck: syntax; Mailloux: implementation; Van Wijngaarden: party ideologist'. The report itself, translated into Bulgarian, Chinese, German, French and Russian, stands from a scientific point of view, in its severity and sharpness of definition, at a lonely peak of mathematical elegance and thoroughness. As part of the ALGOL 68 project Van Wijngaarden developed his elegant and forceful concept of two-level grammars (called after him W-grammars). The design of ALGOL 68 has had an enormous influence on the development of later programming languages and on programming theory and practice in general.

Van Wijngaarden's interest, for that matter, was not limited to algorithmic

languages. He was fascinated by language in general — and in particular by the interface between computer and natural language. He was very keen on the correct and cultivated use of language, and had a special feeling for puns and etymology. He also contributed actively as a member of the Working Group on Frequency Research of the Dutch Language. His love for language, however, did not prevent him from concluding his scientific career in 1981 with a lecture entitled ‘Languageless programming’.

Already at the end of the fifties Van Wijngaarden was actively devoting his organisational talents to both national and international matters. Because also of his courteous and forthcoming way of dealing with people he played an important part in the founding of the Dutch Computer Society in 1959 and of the International Federation for Information Processing (IFIP) in 1960. He held important functions in both organisations for many years.

During the fifties and sixties the computer work of the two Amsterdam universities (the Free University and the University of Amsterdam, VU and UvA) was done at the MC. When, about 1970, this started to form too great a burden for the institute, it was decided to found SARA, a joint computer centre for VU, UvA and the Mathematical Centre. Van Wijngaarden, who was one of those who took the initiative for this unique form of cooperation, was a member of the board of SARA until the end of 1980.

Appreciation for the scientific and organisational contributions which Van Wijngaarden has given to the development of computers, information technology and electronic information processing, is apparent from the many invited professorships he has held and from the decorations bestowed upon him. He spent various periods as visiting professor at the University of New York, the University of California at Berkeley, and the University of Chicago. He was honoured nationally in 1973 when he was appointed Knight of the Order of the Dutch Lion, in 1979 he received an honorary doctorate at the Technical University of Delft (when his first Ph.D. student Van der Poel conferred his degree) and in 1981 upon leaving the MC the award of the ‘Silver Medal’ of the City of Amsterdam. Foreign awards were the ‘Medaille d’argent de la ville de Paris’ (1959), an honorary doctorate of the Institut National Polytechnique in Grenoble (1979), the Wilhelm Exler Medaille of the Österreichische Gewerbeverein in Vienna (1981) and the Computer Pioneer Award of the IEEE (1986).

Van Wijngaarden had a charming and lovable personality. At the same time he was a perfectionist. He characterized his working method as that of an engineer: ‘Engineers don’t start by talking: what on earth would they be supposed to say? They make the design for a project and then say: do you want it?’. These were the lines on which Van Wijngaarden lived and worked: with great style, aiming at perfection, but at the same time with attention and personal interest for the people around him. Here we would like to express our sincere gratitude for everything that was done for the Mathematical Centre and the scientific world by Adriaan van Wijngaarden, Dutch mathematician and computer scientist.



*A. van Wijngaarden, director Mathematical Centre 1961-1980*