Dedication of this Issue

To Gerhard Geldenhuys, a pioneer of Operations Research in South Africa, on the Occasion of his 70th Birthday

"By nabetragting oor die afgelope drie dekades is dit duidelik dat daar beslis aan die verwagtinge van die verslag voldoen is. Dit is werklik bemoedigend dat ON in Suid-Afrika só wyd ontwikkel het dat toepassingsgebiede waarvan daar destyds net gedroom is, vandag goed gevestig is, en dat verdere toepassingsgebiede wat glad nie in die verslag genoem word nie... ontwikkel is. Dit behoort as 'n inspirasie vir operasionele navorsers in ons land te dien en ons aan te spoor om ON nog verder in die teater van toepassings in Suid-Afrika en trouens die hele Afrika uit te dra."

— Gerhard Geldenhuys, in 1992, on the accuracy of predictions in a report and a series of lectures about possible future applications of OR locally, if the subject were to be introduced as a discipline in South Africa. He compiled the report and delivered the lectures at the CSIR in Pretoria during the period November 1962 to March 1963.

1 Biography

Gerhard Geldenhuys was born in Worcester (in what was then the Cape Province) on 19 November 1937. After matriculating fourth in the Cape Province from Heidelberg High School in 1955, he enrolled for a bachelor of science degree at the University of Stellenbosch the following year. He was awarded this degree *cum laude* in 1958, majoring in mathematics and applied mathematics. In 1959 he obtained an honours degree *cum laude* in applied mathematics from the same university, and followed this up with a master's degree in applied mathematics from the University of Stellenbosch in 1961, also *cum laude*, with a thesis titled "Die integrasie van lineêre en kwasie–lineêre paraboliese differensiaalvergelykings met die metode van eindige verskille." He obtained a PhD in computer science from the Rand Afrikaans University (now the University of Johannesburg) with a thesis titled "Stack automata with moveable input markers" under the supervision of Prof APJ van der Walt.

In 1960 Gerhard was appointed as junior lecturer in the Department of Applied Mathematics of the University of Stellenbosch, where he spent the whole of his working life until his retirement in 1998. He was promoted to lecturer in 1961, to senior lecturer in 1966 and finally to full professor of applied mathematics in 1974.

He has been a member of the *Operations Research Society of South Africa* (ORSSA), of the *South African Mathematical Society*, of the *Mathematical Association of America*, of the *American Mathematical Society* and of the (British) *Operational Research Society*.

Gerhard is married to Anneline (née Odendaal) and has three children, as well as three grand children.

2   Studies abroad and the 1963 report to the CSIR

Gerhard spent the academic year 1961–62 on study leave at Harvard University in the United States. Upon his return he spent the period November 1962 to March 1963 as researcher at the then National Research Institute for Mathematical Sciences (NRIMS) of the CSIR. During this time he produced a seminal report on possible applications of OR in South Africa[1], the subject of the opening quote to this dedication. This report turned out to be visionary in the sense that virtually all areas of application mentioned therein realised during later years. During 1979 Gerhard Geldenhuys also worked at the Uranium Enrichment Corporation as Principal Scientist. He worked on the analysis of asymmetric cascades for isotope enrichment, which at that time seemed to offer a route to South Africa's own uranium enrichment facility.

3   Involvement with ORSSA (1969–1998)

When ORSSA was founded in 1969, Gerhard was present, together with other well-known personalities like Professor HS Sichel (who may well be regarded as the father of OR in South Africa), Gerhard Rudolph, Jos Grobbelaar, Dave Masterson, Hendrik du Plessis and many others. Gerhard Geldenhuys served on the national executive committee of ORSSA during the period 1974–75 (acting as secretary during 1974) and again from 1994 to 1997. He also served on the executive committee of the Western Cape Chapter of ORSSA during the periods 1972–73 and 1990–91. He regularly attended the annual conferences of ORSSA, where his contributions covered topics including the teaching of OR, war gaming, allocation of library funds, various applications of scheduling, and graph colouring. ORSSA reciprocated by conferring on him honorary life-membership — today he is one of only three living individuals upon whom this honour has been bestowed.

4   Researcher and Lecturer *par excellence*

Gerhard Geldenuys always considered teaching his primary responsibility — but teaching in his sense was not something different from research. To put it another way, he held that neither teaching nor research could be carried out in isolation. Not only was his teaching invigorated and refreshed by his research, but preparing lectures in a new field often led Gerhard to fruitful research topics. He also saw research as a cooperative activity, often involving students as well as colleagues in his research, never subscribing to the new trend of forced single-author publications for the sake of CV boosting, as is evident from his bibliography (at the end of this dedication).

Apart from the eighteen research papers in international and accredited, peer reviewed journals listed in the bibliography, Gerhard Geldenhuys also published a host of other material, including nineteen technical reports for the Department of Applied Mathematics at Stellenbosch University, as well as twenty popular articles for *Rerum Cognoscere Causas*,

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[1] GELDENHUYS G, 1963, *Notes on some important techniques of operations research*, Internal Report, National Research Institute for Mathematical Sciences, CSIR, Pretoria.

Spectrum, the *Newsletter* of ORSSA, *Die Unie*, *Notices* of the South African Mathematical Society, and *Pythagoras*. In addition, he wrote seven book reviews for the *Newsletter* of ORSSA, and read thirty-four papers at national and international conferences.

Gerhard was amongst the first university lecturers in South Africa to introduce graduate and undergraduate courses on OR topics, such as linear programming. In 1961 he introduced OR at undergraduate level at Stellenbosch University in the form of a series of lectures for third year students in Applied Mathematics. Through the years he developed many more courses at the same department, including a number of topics in discrete mathematics (such as finite state machines, cryptology and coding theory), graph theory, game theory, mathematical modelling of conflict and scheduling theory. Also noteworthy is the fact that in many cases he was the first to produce lecture notes in Afrikaans, which often involved coining new terminology.

As a teacher he took a close and sympathetic interest in all his students (often including their families as well), prompting the following testimony[2] by two of his former graduate students: "Few students who have passed through the hands of Gerhard Geldenhuys, in his capacity as head of the Applied Mathematics Department and organizer of post-graduate Operations Research at Stellenbosch University, will fail to remember the personal interest he took in them as individuals. His blend of formality and approachability is quite unique — a man whose Christian code of conduct is unquestionably obvious, yet someone who is able to relate to students with the most unconventional views. His interest in his students is the more remarkable for the fact that it outlasts their span of 'Matie' years, as evidenced by ongoing correspondence many years into their careers. Many have marvelled at his memory of personal detail." Gerhard Geldenhuys supervised the following two PhD students and twenty-two masters students to completion:

JB Uys (MSc, 1965)	J MacKinnon (MSc, 1966)
H von Molendorff (MSc, 1967)	HC de Kock (MSc, 1968)
TG Alant (MSc, 1968)	PW Stark (MSc, 1968)
JH Smit (MSc, 1972)	SS Loubser (MSc, 1974)
M Sinclair (MSc, 1974)	FP Coetzee (MSc, 1976)
TG Alant (PhD, 1976)	GJ Wessels (MSc, 1980)
J le Roux (MSc, 1981)	PJL Engelbrecht (PhD, 1983)
LM Toerien (MSc, 1984)	C Sippel (MSc, 1985)
J Kok (MSc, 1985)	FE van Dyk (MSc, 1985)
DJ Steenkamp (MSc, 1988)	HS Conradie (MSc, 1992)
L Human (MSc, 1992)	E Botha (MSc, 1993)
T Conradie (MSc, 1996)	C Dippenaar (MSc, 1998)

A notable number of the above students later played central roles in ORSSA and in practising OR in South Africa and abroad.

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[2] Dixon E & Sinclair M, 1991, *A tribute to Gerhard Geldenhuys*, ORSSA Newsletter, pp. 13–14.

5 Accolades

In addition to being an NRF rated researcher, Gerhard won the 1994 award for the best lecturer in the Faculty of Engineering at Stellenbosch University and was awarded the S_2A_3 gold medal for a life–long contribution to science by the Southern African Association for the Advancement of Science in 1998 as well as honorary life membership of ORSSA in 1999, as mentioned in the previous section.

It is indeed a pleasure and an honour to dedicate this issue of ORiON to Gerhard Geldenhuys on the occasion of his 70th birthday in celebration of a lifetime of dedication and contributions to science in general and operations research in particular. Gerhard, may you have a blessed, happy birthday, and may there be many more!

Philip Fourie and Jan van Vuuren
June 2007

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[5] GELDENHUYS G, 1979, *Design of an asymmetric ideal cascade for isotope enrichment*, SIAM Review, **23**, pp. 390–394.

[6] GELDENHUYS G, 1981, *On the Fibonacci numbers minus one*, Fibonacci Quartely, **19**, pp. 456–457.

[7] GELDENHUYS G, 1988, *Die uniekheid van 'n waardefunksie vir isotoopskeiding*, Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie, **7**, pp. 83–84.

[8] GELDENHUYS G, 1990, *Fibonacci enrichment*, International Journal of Mathematical Education in Science and Technology, **21**, pp. 340–341.

[9] GELDENHUYS G, 1991, *A hypergame analysis of the Battle of Magersfontein*, ORiON, **7**, pp. 1–6.

[10] GELDENHUYS G, 1993, *A cohesion index for cooperation in graphs*, Quaestiones Mathematicae, **16**, pp. 229–235.

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[13] GELDENHUYS G, FOURIE PduT, LE ROUX J, 1988, *The Eastern Province blood bank: A case study*, ORiON, **4**, pp. 81–91.

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