Greetings from Roelf van den Heever

A ROAD WELL-TRAVELED

Becoming 60 is a reason for celebration. This is a short note to convey my sincerest gratitude for knowing, cooperating and collaborating with Derrick for most of my productive life. The setting here on my visit to shady, sunny woods north of Atlanta provides perfect reflection ambience. Derrick too has reason to celebrate as will become clear from the following glimpse at his life, a road well-traveled.

We became friends and colleagues, I at the tender age of 28 and he some years younger and a bit wiser after returning from the UK, newly minted with a doctorate in Operations Research. That too was my area of specialty. We both had to be transformed and morphed over the years to become comfortable in Computer Science, then Information Technology and then ICT, last characterized by ubiquitous and pervasive computing. What a shock towards the end of the laborious morphing process! To move from being the high priest promoting and practicing ancient CS rites based on wisdom and knowledge about how to program a computer by means of commands for sequence, choice, and iteration, later spiced up with procedural abstractions to almost just an ordinary person. The constant challenge for vendors and academics over the years was to make computers easier to program and use. Guess what; they have been successful, accompanied by a dissipation of our CS priesthood.

What follows is basically a *Party-Schrift* (PS) and not a "high-priest" contribution, but rather celebratory. Organisers of this "party" be warned that you will have to be available and ready for Derrick's 70th and 80th academic cum having-a-good-time party since his mother got her degree when she was close to 80 and the all-encompassing intellectual/academic/spiritual bent runs in the family.

Possible goals with this PS are: recollections of our years together, possibly some rumination about ICT in general.

The Oracle of Delphi: Derrick exudes an "in touch with the 'gods'" ambience (think more about ancient mythology than modern religion). I thus had the privilege of my own oracle when confronted with potentially life threatening and enriching decisions in academic/departmental/social (lives of students and to lesser extent university colleagues – including myself) context. Unlike the real Oracle of Delphi who was licensed by Zeus to interpret his vague rumblings form the innards of the earth, most often to please the crowd/customers by giving ambiguous answers, Derrick's responses were always wise, very well reasoned, rational etc., rounded with sprinklings (showers?) of humour.

My mother-in-law very often reminded me that my mouth would cause me to get a beating/hiding. Foregoing loses some of the semantics hidden in the original Afrikaans: "*jou bek sal maak dat jou gat slae kry*". Besides realizing that I was fully connected with my mother-in-law, oracle Derrick on several occasions then alerted me audibly to remember my mother-in-law without any other participant in the meeting knowing about the reprimand and the full meaning of: "remember your mother-in-law". Needless to say, it saved me on several occasions – he was thus also a sort of fairy godmother to me.

It is perhaps safe to say that Derrick was the *first* non-Afrikaaner AND non-Dutch-Reformed-Church (AND non-…?) appointee at the University of Pretoria! That happened during the latter part of the 70s and our division/department was never the same again. Not exactly like the smoke, fumes (and mirrors) at Delphi; CS department at UP executed its strategy given from above (admin) but became a

very interesting, exciting blend (brew) of political, academic, religious, roundtable coffee-pot discussions fuelling a critical mass of controversies all with hindsight to the betterment of the participants and the institutions where they participated and got embroiled in.

After the initial period of above mentioned "*Sturm und Drang*" we (Derrick, myself plus *n* others, *n* approximating 0) came to the collective conclusion that the CS department is destined for relative insignificance driven by a serious lack of resources and a "detached admin" (in business this means management). After a torrent of coffee-pot/water-cooler discussions in order to break the admin (at that time) grid-lock we got a break to do advanced software development for money and best of all to make a profit which we could use to appoint assistants, developers and to buy hardware and software. Many students completed their honours and masters studies, attended conferences, etc all financed from our own sources. We could thus move forward via our own free will.

Derrick was a huge contributor on both academic and research/development levels. His intellect has always been a cornerstone of our offerings; so his ability to speak and write English (in view of his Afrikaans colleagues). Just to keep the balance: he and one or more local and international participants from other religions/no religions would get embroiled in never ending search for truth discussions. I have no recollection if anybody ever succeeded in changing others' opinions/believes. Perhaps that was not so important – the mere act of exercising the collective intellect, test controversial ideas were more enjoyable and in the end important.

The company that was born from this profit-motivated research and development and reinvestment in the department, eventually went off-campus, is now international, and employs close to 600 people and is called EPI-USE (USE stands for Unit for Software Engineering). We will always remember those initial years, fights for survival and the constant challenge to have a synergistic, symbiotic interplay of academic and profit goals. Related anecdotes follow.

We two acted as optimization consultants during the 70's, using linear programming for most of our projects, predominantly for needy banks with money. It was not difficult to show how our optimization techniques could outperform a human decision-maker in a specific, deterministic situation. What was difficult was to do proper sensitivity analyses mimicking some uncertainty in real life. Computers of the day took ages to reach an optimal solution that would take present day computers seconds or part of seconds. It was on one such night where we had the campus computer to our disposal and where we had to do several runs and realised that in order to get through the night we will need lots of coffee, supplemented by Coke (soft drink) and then as a gesture of our successes thus far, a nice cigar. Derrick at that time was still a committed smoker. I stopped smoking some time ago before that night. At about 1:30 that night my heart pounded as if it wanted to get out of my chest. I realised all the caffeine and nicotine based stimulation was overwhelming. Because I did not want to die right there where Derrick would not know what to do with the body, I told him we should quit, left for home where my heart got back to normal at about 6:00am. Moral of the story: he can outwork, outcoffee and outsmoke you when required. He is also a firm believer in the conservation-of-sin law whereby each person is born with a constant (old deterministic world, no quantum effects) allowance, called *zeta*. Derrick's given zeta is used up by the foregoing sins and that is why he can actually have his 60th birthday in a church.

The very first EPI-USE project was to build a protocol converter for Amdahl Communications Systems Division, at that time a USA silicon-valley company. The challenge was to transmit IBM bisync messages via an X.25 cloud and back. Whatever we

did had to comply with all relevant specifications and standards, the end product to be used in Amdahl commercial software offerings. The initial challenge was to retool from a "difficult" sequential programming mindset and experience (remember all the 1st year and other students having great difficulty with using the 4 abstractions above) to a real distributed environment. We noted some of the standards used finite state machines (FSM) for specifications. We started to use FSMs for specification only to discover after some time that there is something lacking, causing an uneasiness and lack of trust (our own) in the completeness of our specifications that served as basis for programming. We then discovered *Hoare*'s work on communicating sequential processes (CSP) and realised that this is what we were looking for. Our own CSP-light was used as the specification tool. The emphasis was (still is) on message (event) exchanges between processes and we experienced it as very intuitive. It turned out that it then was relatively easy to extract relevant FSMs from the process specifications for programming purposes. Many years later a similar approach was published in the book by Jeff Magee and Jeff Kramer from Imperial College. Needless to say, Derrick was again the intellectual engine behind this approach that served us very well in years to come.

Derrick gave significant guidance and participated in the development of the system for Amdahl, called the RTX system. RTX was so well specified, programmed, tested that we never had any come-backs after delivering it to Amdahl. In my view this formed the basis for later successes of EPI-USE. Several bright CS students grew up with EPI-USE – they benefited from mentoring and indoctrination received from Derrick. Many still communicate with Derrick and have great respect for his inputs over the years. There was even one (a bright young female) that had some sexual discussions with Derrick; but as you could gather from his instantiation of the above conservation-of-sin law, it was on a pure academic level.

Experience with the RTX system exposed another challenge: how to develop reasonable confidence in the correctness of the system at each phase of specification and eventual programming. We used a small project done for what is now known as Telkom, called the Beltel project, as the guinea-pig. The idea was to do the specification with CSP-light. Derrick would then use his considerable *Prolog* knowledge to transform the CSP-light specification into a Prolog-specification (bit of abstraction) with emphasis on the exchanges of events between processes (can be considered as active objects). The Prolog specification was used to generate so-called traces i.e. expected sequences of events that may result from the specification. These were firstly analysed to determine whether they reflect the intent with the system. Many specification errors were caught relatively easy. After programming (remember FSMs from CSP-light) the traces were again used as a mechanism to generate test cases. It was amazing how successful the entire Beltel development process was. There was only one major hitch caused by an index that went out of bounds in the Pascal program. The foregoing development process born out of necessity was used where relevant and always with good results.

It is easy to not take note of his culinary prowess when reading the above. I e.g. had the pleasure on occasions to experience his mastery of making his famous garlic based salad. It added value to students' learning experience in that they could not get close to us after such a luncheon. Mutton plays a significant role emanating from his background; his father a butcher and ancestors from Palestine.

During 1990 we got another futuristic attack. We realised that after 8 years of contract research and development work, although we succeeded in hiring more assistants, bought hardware and software and graduated excellent students, that we were not internationally competitive. It was back to the drawing board. The overall goal was to come with plans on how we could look and be like a

respectable international university regarding availability of resources to accomplish the major university goals. It was concluded that if we could pool all the ICT related resources on the campus and use them without boundaries within the different existing departments then we should perform much better. Thus was born the concept of the *School for Information Technology* (SIT) which was formalised seven years later and become an official entity at University of Pretoria. Even before this stage we already benefited from the cross-fertilisation brought about by SIT. You guess it: Derrick was part and parcel of all planning and execution processes and as always played a critical role. You all know him as broad spectrum; exactly what was needed for SIT. Silo-oriented personalities do not have the ability to create something like SIT.

I retired from the University of Pretoria the same year that SIT became official. Derrick's career then bloomed as never before. Because of that you have this extensive party for him attended by friends, colleagues, students that not only admire him and his lifestyle but very important, value the contributions he made to their lives.

Derrick has been the perfect partner. Always willing to tackle any challenging problem and before long venture into unknown, hazardous territory where not many could follow him. His broad spectrum of interests, enthusiasm, commitment, ability served all of us very well over the years. I got the impression he was never driven by the desire to put himself up front and build monuments. Thus thanks for the organizers for organizing this occasion on his behalf.

[via EMail: 05 June 2008]