Interview of Rolf Skår

Done by email over many days in September 2012

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The full interview, as approved by the interviewee, is being made available for the use of future historians.

David Walden: Please tell me a bit about your youth [location, family, school before college, hobbies, sports, etc.]

Rolf Skår: I was born at Skår, Karmøy in the Western coastal part of Norway. My father was a fisherman in the winter and a small farmer for the rest of the year. He spent 14 years as a construction worker in Canada before getting married to my mother. When I reached the age of 12, he bought his first car and a year later a tractor. He gave up the small farm when I left for NTH, and he returned to the work he did in Canada, mainly working with rock excavation. I come from a very large family with 71 first cousins, most of the male cousins either became fisherman or ship captains. My youth was dominated by "child labor", working with my father on the small farm, and driving the tractor and doing work for the nearby neighbors. I started making my own money at the age of 14,doing work for other farmers nearby, and I have been financially independent of my parents since then, earning my spending money while at home and paying all expenses for attending university. There was little time for sports and hobbies. I collected stamps and did some speed skating.

DW: I know you went to college at the Norges Tekniske Høgskole (NTH, Norwegian Institution of Technology). Had you already developed an interest in technology and science as a youth?

RS: Technical interest came early by repairs of my father`s farm equipment and his cars. In the summer when I was 13 years, we had a visit from one of my first cousins who is an engineer, and I became convinced that I should study engineering at the NTH in Trondheim.

DW: Please tell me about your college years.

RS: Before being allowed to study engineering at NTH, it was mandatory to have one year of work in an industrial environment. I spent this year at Electric Furnace Products Company Ltd. in Sauda, a metal smelter where I worked in the repair shop. In Trondheim I was privileged to study Control Engineering or Cybernetics under probably the best professor at NTH, Jens G. Balchen. He became an important mentor for me. I took all the computer lectures given at NTH and started to write programs in Algol running on a Danish built computer called GIER.

My later carreer was in a major way shaped by my three last summer jobs (the first summer I was teaching old ladies how to drive a car and get a drivers license). In the summer of 1963 I went to Switzerland to work for an electrical products manufacturer and I learned to know and love this country. Next summer I got the "dream summer job" at CERN in

Geneva, working with digital technology and at CERN I met with Lars Monrad-Krohn who offered me to come to NDRE (Norwegian Defense Research Establishment[1]) and take my diploma there. I also arranged for a girl I had met in Trondheim, Signy, to get a job near Geneva. We met often in Geneva and this ended in a happy marriage, now in its 47th year.

The next year I got even a better summer job, working for NATO Saclant in La Spezia, Italy and here I was responsible for software development for computing how sound ways would travel depending on salinity, temperature and currents. This is important in detection of submarines, and also for submarines to find a place where the sound waves will not travel and a good place to hide.

Returning from Italy, I started my compulsory 18 months military service in the Royal Navy. I was again very privileged to do my thesis at NDRE under the supervision of Lars Monrad-Krohn. At NDRE they had a very advanced 24 bit digital computer called SAM with a 100,000 1960s USD program-controlled graphical display station. My thesis was to show any formula with x and y displayed either in a logarithmic scale or linear. A good example is y=sin(x)/x. My thesis for the Siv. Ing degree[2] involved the translation of any formula into machine readable code (like in Fortran).

DW: After finishing your thesis work, you stayed on at NDRE?

RS: After finishing my graduate work with the diploma in April 1966, I continued with my military service at NDRE and almost immediately got involved in software development for a new 16 bit minicomputer which NDRE developed for the Tromsø Satellite Station. This computer, called SAM-2 was the second computer worldwide to use the just arrived technology with Integrated Circuits (Intel TTL Logic circuits). The first computer to use such new technology was the Apollo Guidance Computer.

I soon became responsible for all software development for the SAM-2. The most important part was to develop the assembler, which translated the user instructions into binary machine code. I became so pleased working with computers and their programming that I never regretted the fact that my formal education was in Control Engineering. As a matter of fact most of my NTH classmates got their first jobs involving either developing computers or using computers for automation.

DW: How did the idea come about that NDRE should develop its own computer?

RS: After the second world war, the Norwegian Government gave priority to develop NDRE as its leading Research Center, and it soon became the most advanced research institute in Norway, in particular in all kinds of electronics. It started a policy where its most qualified staff could visit for one year the worlds leading universities with full payment plus a scholarship from the Research Council. A truly brilliant engineer, Mr Yngvar Lundh, went to MIT and participated in the development of the first modern computer TX-0 (also called

the mother of all computers). The MIT team was lead by Kenneth Olsen who later founded Digital Equipment Corporation and developed the PDP-1.
When Yngvar Lundh returned to NDRE, he designed Norways first computer called Lydia. This was classified work, the computer was used to analyze the sound from the propellers of Russian submarines patrolling along the Northern Norwegian coast.

After the Lydia, Yngvar Lundh built the SAM, a very advanced 24 bit computer with a programmable graphical display. Some of the junior designers on the SAM were Lars Monrad-Krohn and Per Bjørge.

NDRE had the capability and the political support to develop computers. The ambition was always to develop computers which were significant more advanced then those available commercially. SAM was using silicon transistors (not germanium) and for NDRE it was a tradition to use the newest and most advanced components available. TTL Integrated Circuits was very expensive when the decision to use them was made, however they fairly soon became the obvious choice and the most cost efficient.

DW: My understanding is that the idea for starting the computer company Norsk Data Elektronikk came out of the SAM-2 work being done at NDRE.

RS: The work on SAM-2 had started when Per Bjørge returned from his one year stay at MIT in August 1966. SAM-2 was scheduled to be delivered in the summer of 1967. By organizing two teams for testing , or debugging as it was called, working round the clock with Per Bjørge leading the day team working from 1000 until midnight and the night team led by Svein Strøm working from 2200 until noon next day (none of the people involved get paid for overtime), SAM-2 was finished much earlier than contracted for.

We decided to take the SAM-2 computer on a tour visiting the leading research institutes in Norway. The first discussion with Lars, Per, Svein and myself took place at The Christian Michelsen Research Institute in Bergen in April 1967. We met with some individuals who encouraged us to start our own company and so we did. In June 1967, Per , Lars and I gave notice that we would leave NBRE as from September 18th. We did not prepare a business plan. We simply believed we had a very competitive computer.

DW: Was the first Norsk Data computer closely related to the SAM-2, or quite different?

RS: At NDRE we already had started on an improved version of SAM-2 called SAM-3. This computer was to be used by the Norwegian military, Field Artillery Division, for calculating the trajectory of its bullets. The major difference was that SAM-3 would have 48 bits floating point arithmetic in hardware. It was backwards compatible with SAM-2.

The Nord-1 was a direct continuation of the work we had done for SAM-3, some of the printed circuits boards were actually designed before we left NDRE. No one objected that we used both our experience and our work and brought it with us when we left.

We started working at Norsk Data 19.september 1967 and the Nord-1 became fully operational in the spring of 1968.

The Nord-1 was, at that time, the most advanced 16-bit computer available, the nearest competitor, we believed was the Sigma-2 from SDS (Scientific Data Systems). Nord-1 was the only computer for many years to have floating point in hardware and full 16 bit memory address permitting 64 K 16-bit memory. Its cycle time was determined by the speed of its ferrite core memory, typically 1,0 microsecond for register to register operations and 2,0 microseconds for load, store and add instructions. Floating point multiply of two 48 bits words was in the order of 10 microseconds. It had a very rich instruction repertoire with 7 registers including both an index register and a base register. This base register permitted relocatable code or reentry capabilities as we called it.

DW: How was the start-up of Norsk Data funded, and how did you, Lars, and Per divide up responsibilities in the new company?

RS: We had difficulties in funding the start up. Our aim was to raise NOK 600 000.- (90 000USD), and we ended up with only NOK 194 000. Some potential shareholders withdrew on the day of the constitutional shareholders meeting after seeking advice from IBM. My classmate and my first man when we got married, Terje Mikalsen, invested NOK 100 000.-, A mutual friend of Lars and me, Tor Lingjaerde (a CERN employee), invested 30 000. The rest was from ourselves and our family and friends, I had only NOK 8 000.- to invest.
It is interesting to note that the 3 founders, Lars, Per and I paid the same price for the shares as the outside investors. There was not any venture capital available, nor any tradition for paying a lower price for those with the know-how.

Our initial roles were easy to decide. Lars was the President and responsible for all sales and marketing. Per was head of hardware development, and I was head of software development.

DW: What kinds of company or institutions were interested buying (or leasing?) and applying the Nord-1 computer; and did it take a long time for Norsk Data to start making money?

RS: The launching customer for our first Nord-1 was the Taimyr project, to be led by a company called Norcontrol, whose Managing Director also was the first chairman of Norsk Data. This project was funded by the NTNF (The Royal Norwegian Council for Scientific and Technological Research). The computer was to be installed on a commercial ship and for the first time in history: the ships radar was connected to the computer for a computer based anti-collision system. Terje Mikalsen was already a Norcontrol employee, and one of his first jobs was to develop the interface between the radar and the Nord-1 computer.[3] This project was very successful and Norsk Data soon became the world leader in the sale of computers for ship automation. Even today Norcontrol (now called The Maritime Division

of the Kongsberg Group) is the world leader in sales of computer system for commercial ships.

The next customers were research institutes, The Oslo based Sentral Institute (SI) and the Bergen based CMI (Christian Michelsen Institute). The first customers developed their own applications, just using the minimum available software with the assembler and the Sintran operating system as key components.

As a necessity we had to make profit from the very start, and so we did. One third pre payment from the customers was key to our survival in the first years.

DW: You and I first met relatively early in 1970, I believe, while you were a visiting engineer at MIT for a year. I guess Norsk Data continued the NDRE practice of sending engineers to major universities to study for a period. It is surprising to me that so early in the existence of Norsk Data one of the founders could leave for a period of time. How did that work?

RS: It is an interesting question.

At NTH I got to know a visiting professor in computer science, Norman Sanders. More important was that he remembered me because I won a contest to provide a smarter algorithm for a test he gave all students. When I finished my military service at NDRE in December 1966, I wanted to immigrate to the US to find engineering jobs for the Apollo program. However I could not get a job without a security clearance and I could not get a US security clearance without a US job. I then contacted Norman Sanders who had left Norway to become the Manager of Boeing Computer Division. When I told this to NDRE management, they gave me an offer I simply could not refuse. Being 25 years old and still wearing my Navy uniform, I was both offered a scholarship from NTNF and full salary from NDRE for going to MIT as visiting engineer for one year. I accepted this offer and became a NDRE junior researcher, and after 3 months I was promoted to a Research Engineer.

When we in June 1967 decided to leave NDRE for Norsk Data, Per and Lars promised me that I should keep my NTNF scholarship and Norsk Data will pay my salary for a one year stay at MIT on identical terms as Per and Lars had when they were at MIT for one year as NDRE staff. So September 1st 1967, 10% of the staff of Norsk Data left for MIT (we had grown to 11 employees). Norsk Data was to continue this policy for a few others of its R&D staff.

DW: During the time I spent at Norsk Data (September 1970 to September 1971),[4] there was a lot of effort going into building a new machine, the Nord-5. Tell me briefly about the company's plans for a series of computers (or it less about planning and more about opportunism) and the evolution of the business over the next few years.

RS: Norsk Data was always short of money and in desperate need of the 1/3 prepayment. In 1971 the Norwegian Metrological Institute, MI, (Weather Forecasting Agency) got the funds to replace their vacuum tubes computer with a modern computer. However, the funds available was not sufficient to purchase a computer fast enough for their ambitions for numerical computer based weather forecasting. Per Ofstad, who was then head of Marketing and Sales at Norsk Data, proposed to MI a new 32 bit computer, Nord-5, called a satellite computer, because it was controlled by a Nord-1, and had shared memory with the Nord-1. MI had funds of 5 million NOK, and we agreed for that amount of money to deliver a turn key system for running Fortran programs in very high speed. Without the prepayment Norsk Data might have been bankrupt in 1971.

The system was developed in record time , when it was accepted March 12.1972 it was the most powerful computer developed in Europe. It could multiply two 64-bit floating point numbers in about 1 microsecond.
Per Bjørge led the development team, I was his assistant and wrote all the software necessary to control and test the Nord-5. We did not have enough engineers to work double shifts like at NDRE, so from the fall of 1971 until March 1972 the core team members worked from around 9 in the morning until after midnight, many nights until 2.a.m. However, we never worked during the weekends. It was a truly fascinating period of my life.

After the Nord-5 development was finished, the company was in deep financial crises and this led to a change of management. Kolbjørn Johansen who had been recruited as new Chief financial Officer (CFO) became president. And many of the staff working on the Nord-5 team was told to help with sales, we really needed new orders.

This time, the company was saved by some new software. I learned that a truly brilliant software developer, Bo Lewendal, might be interested in coming to Norway. Bo was part of the team who in the early 1970s was developing the worlds largest time sharing computer in a start up company called Berkeley Computer Corporation (BCC).

I was able to get Bo to come to Norsk Data where his first job was to transfer a program called QED (a very powerful and easy to use editor) to Nord-1. Bo saved the company by then single-handedly developing the Nord TSS, a time sharing system for a 16-bit minicomputer with up to 16 simultaneously users.

With this system we were able to penetrate the market in Sweden with sales of TSS systems to the universities of Umeå and Luleå. Soon many Norwegian Technical schools followed.

DW: Bo Lewendal came to you (via BCC) out of the Project Genie community at UC Berkeley funded by J.C.R. Licklider at DARPA.[5] You, Lars, and Per had all spent time at MIT during a time when the computer and computing research had been substantially funded by DARPA.[6] To what extent did these connections to the state-of-the-art of government-funded research in the United States influence either the work at ND?

RS: Without the NDRE and Research Council policy of sending young scientists to the world's leading universities, I am certain that there would have been no computer industry, nor any advanced electronics industry in Norway. MIT, in particular, was the key to all the computer development in Norway. At MIT we learned both how to design computers and their software. We were not afraid of moving state of the art in minicomputer design, which was what we actually did both with the SAM-2 and even more so with Nord-1 with its floating point hardware.

DW: In time, Norsk Data became something of an international company.[7]

RS: The CERN contract Norsk Data, won in December 1972, was the difference between bankruptcy and success. I was deeply involved in this. For their project CERN had decided to use the PDP-11 and had already purchased two PDP-11s. Because of political pressure, the three key decision makers at CERN visited all potential European suppliers. They later told me that they hesitated to visit Norsk Data because they believed we could not afford the expected dinner. During their visit, I took them to the Institute of Atomic Energy in Halden where we demonstrated two important applications: how computers were used in the control of a nuclear experimental reactor, and the TSS operating system for software development. They became truly impressed, and again later they told me that returning to their hotel, they toasted with each other for having found a potential alternative supplier.

I was responsible for the Norsk Data proposal to CERN. I actually also drafted a proposal based upon using PDP-11s (I had access to their price list). Our offer was priced 10 percent lower than PDP-11s, and we offered the not yet developed Nord-10, with a guarantee to ship enough Nord-1`s until the Nord-10 could be delivered.

At tender opening, the verdict was: “The Norsk Data offer was by far the best and the cheapest”. Digital Equipment Corporation (DEC) with their PDP-11 based offer had felt so certain that they would win the contract, that they added a lot of not required options and no volume discount.

So we won the largest mini computer contract in Europe with 24 minicomputers. Personally I moved to Geneva in Switzerland for 2 years as project manager for all CERN business. We opened our first foreign office, and I started to argue with management in Oslo that we should aim for Norsk Data to become “The European Computer Company”.

This was achieved.

The CERN contract led to the financially golden years, where we in 14 years from 1973 until 1986 had a compounded growth rate of 40% annually both in sales and in profit calculated as Earnings per Share. Our share price multiplied by around 1000 times and for the 10 year period 1975-1985 Norsk Data had the best performing listed share in the world with 55% annual compounded growth.

I returned to Norway in 1975 to become Vice-President R&D, and as a side activity was helping sales in large cases of potential business. In 1986 I became Vice-President Marketing and Sales, and perhaps this was my greatest achievement at Norsk Data—to demonstrate that not all sales people are idiots (which was a common thinking among too many of the technical staff), and that success in sales is important for growth, and that sales work is OK even for the technical staff.

We had a policy of arranging for absolutely all staff also to become shareholders by offering shares with a truly deep discount. During several years most staff were making additional profits, called share bonus, equivalent for a year salary.

I became President and CEO, January 1, 1978, however I felt that since returning from Geneva I had almost the same influence in decision making even before becoming formally responsible. I had the confidence of all staff and had proven myself both in software development, in sales responsible for CERN, and for defining the strategy for our future. During my time as CEO the company grew from around 200 to 4400, staff with offices in many European countries and in the US. Sales were truly worldwide wide a particular strength in sales to Nuclear Research Institutes (due to the CERN network of scientists).

Our largest customers was the US Department of Defense through Singer Link for all flight simulators for the F-16 Fighter Aircraft. Each simulator had around 10 Norsk Data computers, and we were the only supplier, so every country using the F-16 got their simulators for pilot training with our computers. In total this contract grew to well above 100MUSD.

Our sustained profitable growth made it possible for Norsk Data to get a listing on foreign stock exchanges. We got our London listing in 1982, followed by NASDAQ in 1983. We raised NOK 800 mill in new equity through one share offering in London in 1982 and two in the US, 1983 and 1984.

DW: In some circles in the US, Norway is portrayed as having a socialist economic system that doesn't encourage "free enterprise" and has confiscatory levels of taxes. That viewpoint seems at odds with the story you are telling. Can you say a brief word about that.

RS: There was very little tradition for entrepreneurial start ups in Norway. However, our major problem was that most people did not believe in what we were trying to do neither did they understand the importance of computers. Because of this we could not raise equity in Norway, we had to wait to raise new equity until 10 years after our CERN breakthrough by our listing in London. The financial press in Norway was very negative; the result was that when our share price multiplied by 1000, only the employees and the initial investors profited. The Norwegian tax system was never a problem, nor were the Norwegian salary levels. The only problem we had with our Government was that they preferred that Kongsberg Våpenfabrikk (now the Kongsberg Group) should take over our company.

DW: In time the company's business declined. What happened?

RS: Our best year was 1986 with total sales of NOK 2,576 million and operating profit of NOK 475 million or 18,4% profit margin, and the market capitalization was around NOK 10,000 million with a share price around 260 NOK during most of the year.[8]

IBM was the big leader in most computer segments. Their pricing policy was based solely upon that its customer should find the purchase or lease of an IBM computer profitable and affordable. There was little or none correlation between manufacturing price and market price, so IBM became the most valuable and most profitable company in the world. Because IBM for many years almost had a monopoly, the US Security and Exchange Commission was tasked to control that IBM profit margins did not go above 25% of sales.

Norsk Data followed the IBM pricing policy, pricing our computers based solely on their value for our customers. We made lots of profits and for many years we were the most profitable minicomputer in the world with around 15% profit of sales. The gross margin (sales price less cost of manufacturing in percentage of sales price) was typically between 65% and 75% for hardware and close to 100% for software.

Then something happened during 1987-1988 which, in effect, killed all minicomputer companies during the few next years. It was a combination of new technologies, in particular the Linux and Unix operating systems becoming available almost for free, and two companies introducing a new pricing model. I believe the first company to start the new revolution was the Boston-based company Apollo, offering a 32 bit workstation with Unix selling for a price calculated based upon the manufacturing cost plus a modest profit. However, it was the California based company offering Sun work stations at a cost of 10-20% of a VAX computer from DEC that ruined the profits of mini computers. For technical computer applications the SUN was able to the same job at the fraction of the price of a VAX.

In the course of some 18 months, the Norsk Data and DEC potential customers could choose between a SUN workstation costing some 20,000USD or a VAX costing more than 100,000USD. Our ND-500 series, selling for around NOK 100,000 or more, could simply not compete in our largest market segment.

A little later the Intel 386 microprocessors with its 32 bit became useful and also offered with easy to use software. This really killed all minicomputer companies including DEC. Only Hewlett Packard survived, and they did so because they had known for many years that their mini computers were not competitive and they “bet their company” on their printer division which was hugely successful.

DW: Norsk Data continued with ever reducing sales and operations for several additional years,[9] but you left the company in 1989. Please tell me a bit about your activities since leaving ND.

RS: I decided to leave Norsk Data in the summer of 1989. Being responsible for the company's growth, I was not motivated to be responsible for its inevitable change to a smaller and different company. At my last day, August 7th 1989, with a farewell speech to all staff and press conference, I got a telephone from the Secretary of Industry, Finn Kristensen, asking me if I would be willing to lead and change NTNF (The Royal Norwegian Council for Industrial and Technological Research) to make it more useful and more relevant.

This was the same NTNF which had financed the SAM-2 development at NDRE, had given me the scholarship to go to MIT, and financed the Norsk Data first computer contract. So maybe it was for also these sentimental reasons that I accepted this offer. Now, in retrospect, I consider my three years at NTNF as my best professional years. I was able to change NTNF as mandated. And personally I was able to focus 100% on my new challenges and not for one second think back on computers and Norsk Data. As a bonus I was appointed by the Government as Chairman of the Board of The Norwegian Space Centre (a part time position).

Industry loved the changes in NTNF; however, many research institutes did not like that, if NTNF should fund its research activities, the research should have the potential to be both useful and relevant. When the Norwegian Government decided to merge all 5 Research Councils into one, The Norwegian Research Council, I was not selected to be its first Managing Director. I felt disappointed, and purchased an expensive very nice car to get rid of my disappointment.

What I really learned and practiced at Norsk Data was to manage change and lead the processes of deciding what changes to do. This was very useful when changing NTNF. I am very pleased that I was able to change NTNF without changing the management team in place when I arrived.

After NTNF, I was available for new challenges. I was approached by Recruitment Agencies and decided to accept the offer to become President of Norconsult International (NI), the largest and the leading engineering consultancy company in Norway. I like to travel, and NI was only working outside Norway, mainly in Africa, Asia, and South America. The job took me to many interesting places, and I fell in love with Africa, and in particular with the Kilimanjaro part of Tanzania and its nearby national parks. As my part-time hobby, I became a tour leader for climbing the Kilimanjaro. I have taken all my family, many friends, and colleagues from work to climb Kilimanjaro. Personally I have climbed to the summit, Uhuri Peak four times. Next fall I am planning my fifth tour with family only—our 5 sons and daughters and their spouses and including most of our 16 grandchildren for some 25 family members all together.

When I got the opportunity to work full time in Space activities, I was very pleased when I became in 1998 the Managing Director of The Norwegian Space Centre.. To work with space challenges was my dream from my first years at NTH. Already, in 1993, as Chairman of The Norwegian Space Centre, I became the Norwegian participant to the ESA Long Term Space Policy Committee, and responsible for proposing new policies for rockets, so I

already had a network in Europe with other space [technology] leaders. I worked very closely with NASA while at The Norwegian Space Centre; and together with NASA, we developed Svalbard with its Svalsat to become the worlds largest ground station for data reception and commands from and to polar orbiting satellites. Maybe my greatest achievement was being responsible for two subsea fiber optical cables connecting Svalbard to the rest of the world, financed by NASA and NOAA.

After retiring from The Norwegian Space Center, I was asked by ESA to join ESPI (European Space Policy Institute) in Vienna as the Permanent Resident of its Founders. This was two wonderful years (2006-2008) in the beautiful city of Vienna in the Center of Europe. I was able to continue my thinking of alternative rocket designs and proposed to use the world's largest aircraft , the Airbus 380, as the first stage in an air launched system. This idea has been taken up by Virgin Galactic. They now are developing an air launch system using a new very large aircraft specifically designed for such use.

Maybe the most interesting hours in my professional life were an in depth discussion with Mike Griffin, previous NASA administrator, about my idea for a different approach for going to the Moon and maybe to Mars. Based upon the Apollo architecture and also being inspired by the fully automatic assembly of large underwater installation pioneered by Norwegian developments in oil and gas exploration, I proposed that rockets for going to the Moon and to Mars should be assembled in Low Earth Orbit (LEO) by fully automatic assembly (similar to the way Space Stations like MIR, ISS and now the Chinese Space station are assembled). This would eliminate the need to develop new very large rockets: the Falcon-9 Heavy could easily and affordably transport the necessary rocket stages to LEO. Another advantage would be to place in Moon Orbit beforehand, the necessary rocket stages for the return to Earth. The same procedure could be used for going to Mars, however many more rocket stages would be needed compared going to the Moon. I was so pleased when Mike Griffin told me, that my idea for going to the Moon was completely feasible, however going to Mars would require in his opinion the use of nuclear rockets.

After returning from Vienna, I have continued to work both for ESA, where I am currently one of their two ESA Industrial Ombudsmen, and as a consultant to the Norwegian Space Centre.

DW: Your career path from the farm through pioneering computer technology to space technology has been extraordinary.

RS: I believe several things have been important in shaping my life. My childhood involved lots of work, making my own money, never asking for money from my parents, and learning to take responsibility for everything I did. I was a quick learner and I got top grades at all schools and university. I always was willing to go my own way, being independent, with a strong belief that my ideas would succeed. And finally I always have been a businessman.

DW: Thank you very much for taking the time to participate in this interview.

RS: My pleasure. By the way, I just started to work for the Norwegian Space Center again, as a senior adviser. I enjoy having always something to do.

Notes and References

[1] Forsvarets Forskningsinstitutt, or FFI, in Norwegian
[2] Sivilingeniør degree issued in Norway to graduates of technical universities.
[3] Terje was recruited to Norcontrol in the fall of 1965, long before any plans for starting Norsk Data. As the largest shareholder of Norsk Data, Terje felt he was to young to be Chairman of the Board, so he asked the Managing Director of Norcontrol to be the first Norsk Data Chairman of the Board.
[4] Nils Liaaen and David Walden, "Remembering the LFK Network", *IEEE Annals of the History of Computing*, Vol. 24, No. 3, July-September 2002, pp. 79-81.
[5] http://coe.berkeley.edu/news-center/publications/forefront/archive/forefront-fall-2007/features/berkeley2019s-piece-of-the-computer-revolution
[6] Special issues of the *IEEE Annals of the History of Computing*, vol. 14 nos. 1 and 2, 1992.
[7] Tor Oval Stein, "The founding, fantastic growth, and fast decline of Norsk Data AS", *History of Nordic Computing*, Springer, 2010, pp. 249-257.
[8] In 1986 the NOK to USD exchange rate was about 7.4 to 1.
[9] http://toresbe.at.ifi.uio.no/nd/