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# The Founding, Fantastic Growth, and Fast Decline of Norsk Data AS

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**Abstract.** Norsk Data was a remarkable company that in just twenty years went from a glimmer in the eyes of some computer enthusiasts to become number two in share value at the Oslo Stock Exchange. Within a few years thereafter, it collapsed, for no obvious reason. How was this tremendous success possible and why did the company collapse?

**Keywords:** Collapse, computer, F16, industry, minicomputer, Norsk Data, Nord, simulator, success, Supermini

## 1 The Beginning

### 1.1 FFI

A combination of circumstances led to the founding of Norsk Data<sup>1</sup> in June 1967. Several brilliant researchers came together at the Norwegian Defense Research Institute (FFI)<sup>2</sup> in Kjeller outside Oslo, Norway. Under institute director Finn Lied, division director of telecommunications Karl Holberg initiated a digital group and appointed Yngvar Lundh as its project leader. Lars Monrad-Krohn was appointed leader of the digital lab.

Yngvar Lundh had experience as a researcher at MIT (Cambridge, MA) during a stay in 1959, Monrad-Krohn followed with a similar appointment in 1962–64, while Per Bjørge, another brilliant computer developer, did his own MIT tour during 1966.

These researchers were impressed with the fast development of computer technology at MIT [1, 2] and soon FFI was itself active in the field, building two military systems, SAM and SAM2. Due to the fact that SAM2 was being built with the new Dual-In-Line (DIP) Integrated Circuit technology, it also had civil potential.

In time, the idea of launching a spin-off company for the civilian market was born. Consequently, Lars Monrad-Krohn and Per Bjørge, together with Rolf Skår and Terje Mikalsen, founded ND in June 1967. Monrad-Krohn, Bjørge, and Skår all worked for the company, with Monrad-Krohn as the unquestioned leader. Although Terje

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<sup>1</sup> The company name was initially Nordata, Norsk Data Elektronikk A/S, later changed to Norsk Data AS for international simplicity.

<sup>2</sup> Forsvarets forskningsinstitutt (FFI).

Mikalsen was not employed by the company, he convinced his ship-owner father-in-law to invest in it; even Monrad-Krohn's mother and a number of FFI friends and colleagues bought shares in the company.

## 1.2 The First Bumpy Years

The first few years were bumpy – a balancing act between failure and success, with the latter depending on special contacts, a few key sales, and a highly motivated team of employees. NorControl AS, a company making control systems for ships, employed Terje Mikalsen, who had studied with Rolf Skår at the Norwegian University of Science and Technology. There he helped convince his boss, Ibb Høivold, to use a general purpose computer as an integral part of their system for a new ship, thus providing ND with its first customer. The basis for this vital project, supported by the National Research Fund, had already been established the year before.

Taimyr was an ordinary bulk carrier, commissioned by the Norwegian ship-owner Wilh Wilhelmsen, for which Norcontrol supplied the on-board electronic control systems. The radar was to be extended with a Nord-1 computer (the first ND computer, designed by Per Bjørge) for automatic collision avoidance. This computer was delivered to SINTEF (a large independent research organization carrying out projects for many companies) in Trondheim, remaining there a year before it was moved on board the ship.

The development of the system included a new assembly code generator (Mac), a new operating system (Sintran), and application programs written in Fortran. The operating system was named Sintran (from SINtef and forTRAN) and functioned flawlessly for years!

Other critical early sales were to SINTEF itself, which ordered the first minicomputer with virtual memory in 1968, and to the University in Bergen (UiB). The contact person at UiB developed a positive attitude toward the newly formed computer vendor and later moved to become the central contact for most purchases from the Norwegian government institutions.

In 1970, ND teamed with Siemens and obtained a contract to build a packet-switching network (based on Norsk Data's new Nord 2B machines) for the Norwegian Air Force Supply Service. Dave Walden, who had been part of the BBN (Cambridge, MA) team that developed the ARPANET packet switch (precursor of the Internet router), spent the year 1970–71 working at ND and leading the software implementation for the network [3]. Before returning to BBN in September 1971, Dave Walden recommended Bo Lewendal, a brilliant Swedish-American who was unemployed after two years developing a large time-sharing system for Berkeley Computer Corporation (BCC) [4], to Rolf Skår, then software development manager at Norsk Data.

When Lewendal arrived in 1971 he asked Rolf Skår for permission to develop a time-sharing system for the Nord-1 computer. Since everybody was on holiday during the summer, he spent a few weeks in solitude working on his project, and at the end of the summer, Nord TSS was functioning in its first, rudimentary form.

Other key personnel from FFI, SINTEF, and directly from the universities were attracted to the company. Norsk Data became *the* place to be for ambitious engineers with an interest in computers.

## 2 The Demanding Customers

In the next few years, a number of specific, often difficult, contracts enabled ND's continued survival and expanding reputation for computer technology and customer service. Only a few of these activities can be mentioned in this paper.

### 2.2 CERN

In 1973, ND was invited to bid on a contract with CERN, the giant research institution outside Geneva. Among other things, the task was to monitor the new SPS particle collider ring. There was considerable competition for this prestigious contract. Fortunately, Norsk Data shareholder Thor Lingjerde was at CERN at the time and managed to arrange on-site demonstrations of the Nord-1 computer. Norsk Data, with the first time-sharing system in any minicomputer (a further developed Nord TSS), eventually won the contract in 1973, after fierce competition from other European bidders and from Digital Computer Corporation of Maynard, MA. Several of ND's key people used their own cars to deliver various parts of the equipment from Oslo to Geneva, staying there for days and weeks to make things work.

At that point in time, this contract was the key to the very survival of the company. Rolf Skår summed it up as follows: No Bo Lewendal, no time-sharing system. Without the time-sharing system, no CERN contract, and ND would have been bankrupt in 1973!

The extraordinary effort from key personnel during this delivery made Norsk Data's management aware of the fact that sometimes a single programmer or technician is much more important for the future of a company than any executive or chairman. The shaping of the company's personnel policy was made on that basis and it became rather different from other, similar companies in the following years.

The people working at CERN itself represented the best brains in Europe. They influenced the further progress of Norsk Data computers through active involvement with the ND developers.

Two key persons at CERN, Robert Cailliau and Tim Berners-Lee, aimed to solve the problem of organizing the vast amount of documents necessary within CERN, by using "hypertext."

Their first attempt was called Enquire, developed on a Nord 10 computer [5]. Tim subsequently implemented it in a windows fashion on a Next computer. In 1993, the world wide web was launched internationally, and one could safely say it turned the world upside down, helped by Marc Andreassen's Mosaic browser. Cailliau later served as a chairman for the W3 Consortium for many years.

## **2.2 The Norwegian Meteorological Service (MET)**

Per Ofstad, who was the head of the University of Oslo's (UiO) computer center, conceived the idea of a special computer for fast computations as a "slave machine" to an ordinary computer. The concept was mentioned to Lars Monrad-Krohn, who thought the idea was good and achievable, but would be costly to develop. Nevertheless, a year later the institute decided to acquire such a system from ND. Since the project would tie up ND's development resources for a long time, the company offered the system at a substantial price, and the project was launched at high risk. It was delivered on time, and the Nord-5, the world's first 32-bit super-minicomputer was born, which later evolved into the ND 50, 500, and 5000 series of computers.

## **2.3 Singer Link – the F16 Simulator**

In 1977, the NATO countries of the Netherlands, Belgium, Denmark, and Norway joined forces in the "weapons deal of the century" to purchase new fighter planes to replace their mixed and ageing fleets of jet fighters. Such international weapons contracts often involve "offset" contracts, that is, some of the development work is given to companies in the purchasing countries.

Norway had little to offer with respect to offset projects (a few went to Kongsberg Vaapenfabrikk). In the search for viable offset projects, one of the bidders for the pilot training simulators, Singer Link, which needed fast computers for its simulators, approached Norsk Data.

The newly employed head of education, Jan Bjercke, looking for a desk of his own, found the forgotten telex request from Singer Link in a drawer. Jan knew about the newly developed Nord-5 and proposed that four of them be combined into a system for each simulator. Such a proposed system could easily cope with the requirements. The new Nord 10 with virtual memory and new operating system, Sintran III, had just been released; a new Nord 50 and a multiport memory were also developed, allowing several Nord 50s to be connected to each Nord 10.

Thus, the combination of the virtual memory from SINTEF, Sintran from SINTEF and the Taimyr project, Nord-5 from the MET projects, and a new multiport memory comprised the basis of a new and especially demanding project – a powerful online computing system for flight simulation! Jan Bjercke and Rolf Skår (who became ND's Managing Director a few months later) traveled to the USA to finalize the sale.

Although the project was very demanding for a relatively new computer vendor, the systems were delivered and accepted on their scheduled dates (something the customer had not previously experienced). A demanding customer can be very useful to an evolving computer vendor.

## **2.4 The Norwegian State Railway System (1976)**

In 1976, the Norwegian State Railways (NSB) planned a new system to keep track of all its freight cars, which involved arranging trains at the shifting station in Alnabru

outside Oslo and optimizing car maintenance. The system, which could save millions through a better utilization of the car pool, was named GTL (Gods Transport Ledelse – “Gods” had no divine link; it simply means “cargo” in Norwegian<sup>3</sup>). The system required a Transaction Processing (TP) monitor capable of handling 150 terminals and heavy on-line traffic with a 24/7 operational capability. (ND’s competitors were US-based mainframe vendors.)

ND knew that a single minicomputer would be unable to deliver this capacity. Thus, all the terminals in the network were connected through ND’s new Nordnet, and all the transactions would appear at a single pair of threads. The TP system divided the work between four Nord 10s, each handling specific tasks. The machines could be backups for each other, and inter-CPU communication was also through Nordnet. The database management component of the freight car system was the SIBAS system (previously developed SINTEF in Oslo) – a traditional CODASYL DBMS first implemented on a Nord 1.

The system was delivered on time, functioned as planned, and served with impressive stability and performance during its entire lifetime.

## **2.5 Product Strategy**

New technologies were quickly applied, demonstrating that the organization had the courage to take on the formidable risks of new applications and still be able to deliver on time. What this implied about the efforts, skills, and motivation of ND’s employees in the early days is worthy of a study of its own.

As in subsection 2.1–2.4 above, projects were often built upon each other. It may not have been a conscious plan, but limited resources made it necessary, thus teaching ND how to “rationalize” its products (keep the number of products at a compact level, but make sure they interact well and can be combined in a flexible manner).

This ability was one major key to the profitability of the company during the following years of rapid growth. Competitors, on the other hand, often had competing lines of products that were sometimes mutually incompatible. ND avoided this and could therefore keep a smaller staff for development, technical support, and customer education.

## **3 The Years of Fast Growth**

### **3.1 Stock Listings**

The company became very successful, showing rapid growth and excellent financial results. However, cash was required to finance growth, which the original owners alone could not support; they had to turn to the stock market in Norway. Annual returns showed steady, profitable growth attractive to potential stockholders, resulting

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<sup>3</sup> Hence, the “Gods Expedition” at the station “Hell” outside Trondheim in mid-Norway is a major tourist attraction...

in increasing share prices. In addition, there was a periodic share split to maintain the stock price within an attractive “value band.”

However, ND eventually grew too big for the Oslo Stock Exchange and Norsk Data was listed on the London Stock Exchange in 1981. This was a major breakthrough regarding access to larger scale financing. In the same year, 1981, Norsk Data was also listed on the “Over the Counter” stock exchange in New York after Terje Mikalsen and CTO Tor Alfheim had presented the company to the investment bankers at Morgan Stanley (CEO Rolf Skår had to stay home due to a back injury). The bankers had “a good feeling” about the company, which had not been felt there since Digital Equipment Corporation some years before. When Terje Mikalsen presented this news at the annual sales meeting in Lillehammer in 1981, a sense of awe swept the room. Before the sales meeting ended, the stock price doubled, initiating an upward journey that lasted for almost ten years.

### 3.2 The “ND Spirit”

During ND’s first few years the focus was on technology and products, but it soon became clear that it was the attitude of the employees that was the company’s most important success factor for the future.

The concept of an “ND-spirit” became a vital element in developing a highly motivated staff capable of obtaining the extraordinary results that were achieved during the following years. CTO Tor Alfheim illustrated the ND spirit by putting a blank sheet on an overhead projector in front of the employees: “You cannot see it” he said “but it is here,” holding the blank sheet in the air as evidence.

The employee policy was consciously planned and implemented by the early founders, Lars Monrad-Krohn in particular. These guidelines were given to every new employee:

<i>Work:</i>	You spend at least half of your waking time at work – get the most out of it!
<i>Solutions:</i>	Do not choose the easiest solution; choose the one you think is right!
<i>Work pressure:</i>	The reward is usually proportional to the difficulties.
<i>Things you dislike:</i>	Do something about them; improve them if they are important enough.
<i>Work instructions:</i>	Until you are certain someone else has taken over the responsibility, it is your own.
<i>Colleagues:</i>	Find out which ones are important to you (organizational chart disregarded) and treat them accordingly.
<i>Instincts:</i>	Be skeptical of some instincts, do some of the things you dislike the most, talk to some of the persons you dislike the most.
<i>Performance:</i>	If you are honest with yourself, you are the best judge.
<i>Improvements:</i>	You are allowed to propose improvements, even if you are not perfect yourself.
<i>Obedience:</i>	If you are convinced that you are right, stick to it.
<i>Personality:</i>	Be yourself. Like yourself. Improve yourself.

*Mistakes:* Admit them.  
*Chances:* Take them.

The company was geared for rapid growth in a technologically complex and changing world and had no time for formalism or time-consuming procedures. Efficiency was a key success factor and the best way to obtain this was on the basis of a philosophy derived from the late Col. Ole Reistad<sup>4</sup>, which ND, in essence, adopted: “Do whatever you find most efficient to obtain our common goals, and make sure to adjust your activities with the others when needed.”

Not everyone thrived in this environment, and some missed education, information, and instructions for what to do next. On the other hand, for those who had a curious, open-minded and independent attitude to life in general, this was heaven on earth.

### **3.3 “Management by Eating Around”**

The top managers of ND had a formidable task. They not only had to satisfy a rapidly increasing group of anxious stockholders, but also had to know and react to developments in the highly complex market while managing their own people who were busy doing equally complex work to meet the challenges of the same market.

Thus, ND management eschewed relying on weekly or monthly reports, attending seminars, or hiring consultants in order to understand future technology trends. Instead, they gathered the information directly from the sources themselves – no intermediaries or delays in becoming informed.

An important aspect of staying informed and synthesizing the essence of information into knowledge upon which to base decisions that shaped the company’s future took place in the ND canteen. Management always arrived late for lunch and spread out at the various tables. Business discussions during the meals were common, especially when a main executive was present. Information was obtained directly by the people who needed it from the people who knew. And over the long term, management could observe how the staff members developed, who was ready for promotion and who might need some guidance.

Management by eating around was never a specifically stated policy within ND – it was just practiced. (There was no partitioning of the canteen into blue collar, white collar, and executive areas.) This ND approach worked until the computer industry changed toward the end of the 1980s.

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<sup>4</sup> Mr. Ole Reistad led the Norwegian military Olympic team to its win of a gold medal in St. Moritz in 1928. One exercise was a downhill race to a goal 3000 feet below. His command became legendary: “We’ll regroup at the bottom,” implying that everyone had to find the best path down the hill, and then join ranks. They won, of course.

## 4 Crisis and Downfall

### 4.1 What Happened

In 1981, IBM had launched the Personal Computer era [6] and the machine independent operating system Unix was beginning to win ground in the research world [7]. Their common denominator was an “open architecture,” and customers welcomed the possibility of not being bound to computer vendors with their proprietary software systems.

The proprietary mini-computer era was drawing to an end, and the entire computer industry was rocked by a paradigm shift (a disruptive transition in technology) that lasted for a decade or so [8]. All traditional computer vendors struggled to adapt to the classic situation.

- Existing customers who loved existing products continuously asked for the addition of more features.
- The new open standard products had fewer functions than the established proprietary ones, but were less expensive, both in purchase price and in life cycle operating costs.
- If an established vendor launched open standard products, it also undermined its more profitable, proprietary product line.

Hence, most computer vendors tried to resist the transition while giving ‘lip service’ to the new trends. In order to maintain profitability, a vendor that put all its efforts into open standard products needed to sell in greater volumes, which thus required a slimmer sales- and support organization.

“Lean and mean” became the winning formula.

### 4.2 Why Norsk Data Failed

In 1986 and 1987, Norsk Data was ranked among the most successful computer companies in the world, according to the lists established by the Datamation magazine [9]. ND’s position as the third most profitable computer company in the world was only outranked by Cray Research and Microsoft [10].

However, close examiners of the 1986 results may have noted a slight reduction in the growth of profits and that some development costs had been added to assets in the books, a change from ND’s prior policy of treating all development costs as expenses. Norway had become an oil producing country, but a significant drop in oil prices made the government, ND’s largest customer, less willing to invest in more computers. This was a major reason for the pressure on profits.

Norsk Data did not manage the transition! A shift in technology would have required a total change in company culture and customer support; existing customers would not accept any reduction in the support level for their recently purchased products.

The situation was difficult for ND’s management, oriented as it was to growth and not to restructuring. Yet ND reacted early and in a reasonably competent manner. A new Unix line was developed, and PCs were added to the product range and

integrated with the existing line of minicomputers. The company realized early that the minicomputers would be reduced to “network servers” in the future, and the ND 5000 line of new computers was consistently called a “server” line.

In 1989, after a considerable loss was posted in the accounts of the previous year, a major reorganization and restructuring of the company was necessary. The company was divided into several new business units, three of which were sales organizations, and two were a service division and a “box mover” style telephone sales component for PCs and auxiliary equipment. Computer production and development was separated into a company (Dolphin) selling servers.

Vacant positions for the new companies were posted internally, and all employees had to apply for a job in the new structure. Unfortunately, eight hundred people became redundant in the initial process, and a further five hundred were dismissed two years later. A rationale for the restructuring was to save some of the investors’ money by selling off the various companies in the new organization, the companies that were seemingly adapted to the anticipated future structure in the computer business.

Behind the scenes, attempts were made to join forces with, or to sell Norsk Data to companies such as Apollo Computer, Nixdorf, Siemens, ICL, and even Sony. None of these were successful. The Nixdorf deal was the most promising one, and a final meeting was planned during the 1986 CeBIT Fair. However, Heinz Nixdorf died of a heart attack on a dance floor just prior to his planned meeting with Rolf Skår. The German operation, which mostly sold CAD/CAM systems<sup>5</sup>, was eventually bought by Intergraph.

In 1986, when the situation still seemed to be relatively good, Norsk Data used a number of its shares as security for a loan from Deutsche Bank in Germany. The loan was to be repaid in full a few years later. When the company could not repay the loan, it was taken over by the Norwegian bank, Den Norske Bank, which sold it to Telenor, the major Norwegian telecom operator, for less than they could write off in taxes (due to the inherent losses in the Norsk Data accounts).

All that remains of Norsk Data are the skills and competence of former ND employees who went on to companies such as Ergo Group, EDB, Telenor, Umoe, to mention a few. The hard-core CPU developers are still alive and active in Numascale [11], a company spin-off from Dolphin. Led by Mr. Kåre Løchsen (a major designer of the legendary ND 500 – used in the F16 flight simulator), they develop revolutionary technology for massive multicomputer clusters, thus carrying the tradition of the ND spirit into the future.

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<sup>5</sup> CAD = Computer Aided Design, CAM = Computer Aided Manufacturing.

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