Individual Companies and Developments

Nixdorf – pioneer of decentralized data processing

Christian Berg

1. Introduction

Nixdorf Computer AG (NCAG) – founded in 1952 as the Labor für Impulstechnik (Laboratory for Impulse Technology, LfI) – was part of a piece of post-war German economic history. At the dawn of the German computer industry, Heinz Nixdorf, born in Paderborn, Germany, in 1925, took the opportunity to open new markets in a novel industry.

He entered the then still new field of electronics unburdened by the electromechanical tradition of established office machine manufacturers. Nixdorf recognized the immense market potential for smaller commercial computing systems below the market-dominating mainframes early on. Together with a few other companies, such as Kienzle[1] and Siemag/Philips[2], he created computers for the commercial-administrative sector in the mid-1960s, which, in terms of price and performance, could also be used by small and medium-sized businesses. Mid-range computing was born.

Nixdorf, in accordance with his user-focused objectives, also provided demand-oriented software and information technology (IT) training for his customers in addition to the hardware. This "all-round service" gave NCAG a competitive edge and great business success, especially among medium-sized companies without their own IT department.

Computers at that time developed over a few years into multi-user systems with their own networks or networking with mainframes, and NCAG was able to maintain their initial lead. By the end of the 1970s, Nixdorf was Germany's market leader for mid-range computing and rose to become Europe's fourth largest computer company.[3]

1 For Kienzle, see also the article by Armin Müller in this volume.
2 Henrich-Franke: Innovationsmotor Medientechnik.
3 See also Berg: Heinz Nixdorf.

2. Starting with the Nixdorf 820

In the 1960s and early 1970s, "the basis [...] of [the company's] success"[4] was the so-called Nixdorf 820 computer. The company had already started the first developments in 1963, while it was still manufacturing under the name LfI, as a supplier for office machine manufacturers, such as Wanderer and Ruf. This computer was presented to the public for the first time at the Hannover Trade Fair in 1965 under the name Wanderer Logatronic and Ruf Praetor. The press was impressed by this innovative "small computer"[5] and stated, among other things, that "the applications for this accounting machine [...] extend far beyond those of conventional bookkeeping machines".[6]

The Nixdorf computer was one of the "boldest and most trend-setting designs",[7] especially since the overall concept envisaged using as few mechanical parts as possible from the traditional office machine industry. Thus, a IBM ball head typewriter was used as the input and output unit, replacing "expensive and heavy carriages or [...] high-speed printers".[8] The computer was also designed according to a modular principle. All models were built around the central processing unit, which, in turn, consisted of a combination of the following functional units: computer, input and output unit, micro and macro programme, and magnetic core memory: "The System 820 [...] follows a very wide-ranging modular concept. The electronic calculation part can be expanded within a wide range. Programming is mainly 'wired' on interchangeable plug-in units. However, the magnetic core memories also allow 'living' program storage. The peripheral units were also a modular system based on the IBM ball head typewriter."[9] This modular design and the strict separation between mechanical and electronic components also facilitated maintenance and repair work, so that faults could be quickly located using test programmes and the faulty component could be replaced accordingly.[10]

4 Nixdorf, Heinz: Vom Bumm [sic! This should be Bull, author's note] Gamma zum Rechner 8818, in: Die Welt, 2 April 1986.
5 Bürotechnik und Automation [BTA] 5 (1965), p. 240.
6 Büromarkt 11 (1965), BK 242 Rechnende Schreibbuchungsmaschinen, p. 40.
7 Bongartz, Karl Heinz: Hannover Messe 1967, BK 24 Buchungs- und Fakturiermaschinen, Buchungsmittel, in: Büromarkt 12 (1967), p. 10.
8 Nixdorf: Bumm.
9 Büromarkt 12 (1968), Nixdorf, p. 31.
10 Hanewinkel: Computerevolution, p. 81.

The Nixdorf computer was less susceptible to faults, as competitor Kienzle also admitted: "With regard to the invoicing machines, it should be mentioned that the 'Prätor' for Ruf and the identical 'Logatronic' for Wanderer were a great success under Nixdorf's personal influence and went into production so carefully that no complaints have been reported."[11]

The concept of the System 820 was also considered trendsetting, since, for the first time, "two previously different working principles [were] combined in the field of data processing. On the one hand, it [was] an EDP [electronic data processing] system with regard to its functional operation and internal efficiency, which [made it] quite comparable to the systems that had existed on the market up to that point. On the other hand, the System 820 [offered] the possibility of direct data entry via keyboard. It is precisely this possibility of direct data input and processing that allows users to retain the working principles that they are familiar with from, for example, invoicing and accounting machines."[12] In other words, when using the new computer, customers did not have to familiarize themselves with fundamentally new work processes, but could retain the work steps they had learned and practiced.

After the Nixdorf computer had caused quite a stir at the Hannover Trade Fair in previous years, it was Heinz Nixdorf himself who first attracted the attention of a wider public in 1968: "For every professional, Hannover offers plenty to talk about every year in addition to the exhibition itself." There were usually rumours and discussions about technical and factual matters, however, this time a person was in the foreground: "Heinz Nixdorf, a man who until now had kept himself modestly in the background as a supplier of office machines, announced at a press conference that he was taking over Wanderer-Werke AG, Büromaschinenwerk, Cologne. The de facto takeover by a sole proprietor is already a rarity in a phase of market concentration, the handing over of an DM 18 million cheque with personal cover no less."[13]

The overall focus of the Wanderer-Werke had remained electro-mechanical bookkeeping machines, so that the management had manoeuvred the company into the technological sidelines within a few years, although the company had a pioneering model in its product portfolio from 1965

11 Ernst: Die Entwicklung, p. 82. The work remained unpublished but is available in the HNF archives, see HNF 3-Sg/0183, Bringer's estate.

12 BTA 5 (1968), S. Nixdorf System, p. 248.

13 Hofmann, Klaus P., Messe Hannover 1968, in: BTA 5 (1968), p. 226.

onwards in the form of the Logatronic computer. They remained in the familiar patterns and structures for too long and were not able to change track. The company ran into financial difficulties in 1967 when it finally tried to set up its own electronics production and, at the same time, hired new employees for development, production and sales, as well as purchasing semifinished products and other materials for production on a large scale.

Wanderer's main shareholder, Dresdner Bank, had, therefore, already been negotiating behind the scenes with Nixdorf about the sale of Wanderer-Werke since July 1967. Nixdorf was interested neither in the expertise in producing office machines nor in the office machine factory in Cologne itself, but in the sales department. The latter comprised 45 general agencies in Germany, another 30 agencies in other countries, as well as subsidiaries in Italy, France and Spain.

Nixdorf had been interested in establishing its own distribution organization since 1964, when the French company Bull, which had, at that time, bought about 90 per cent of Nixdorf's products, stopped doing business with Nixdorf altogether, due to the entry of General Electric. "This transaction deprived us of our distribution base from one day to the next. […] The realization that without our own distribution department we would be 'nothing' in the computer industry mobilized all forces to form a sales organization. But it took six years to achieve this. […]. The final step had been the acquisition of Wanderer-Werke, which led to the old company being renamed Nixdorf Computer AG."[14] The purchase made the laborious and lengthy process of developing a distribution structure of its own obsolete, and the trade press said: "With the Wanderer distribution organization, Nixdorf now has more or less the strongest distribution organization of more demanding and efficient professionals which represents the old Saxon-Thuringian heritage of brands in the areas of computing and accounting."[15]

As a result of the acquisition of the Wanderer shares in April 1968, Nixdorf was the *de facto* owner of two companies: the Cologne-based office machine factory, including distribution, and the LfI in Paderborn. Nixdorf Computer AG, formerly Wanderer-Werke AG, acquired LfI on 23 April 1969, with retroactive effect from 1 October 1968. The annual report states:

14 Nixdorf: Bumm.
15 Basten, Peter: Wanderer zu Nixdorf, in: Büromarkt 10 (1968), p. 22.

"From October 1968, our business will be determined by the production and distribution of electronic computers. Thus, at the same time, the continuation of the Paderborn company's business has become the main object of our business operations."[16]

Founded in 1952 as a one-man operation in post-war Germany, within about 15 years the computer firm developed into a company with almost 2,000 employees and a turnover of more than DM 100 million in 1968. Nixdorf ventured directly onto the market in its role as a competent supplier with the 820 magnetic accounting computer, which dominated the market as early as 1967/68.[17]

3. The next generation: magnetic disk storage

There was another giant leap in storage technology in the 1960s, but the 820 was technically unable to cope with it. In the same way as the punch card had previously been replaced as a storage medium by magnetic tape and magnetic account cards, account cards were subsequently replaced by magnetic disk storage. The NCAG also had to cope with this memory change in order not to lose its technological position in the computer industry. However, the development of a new system range with magnetic disk storage, which later became the 88 system, had not yet been completed, and the turnover and sales figures of the 820 stagnated from 1972. A new revenue stream was needed for the company, and, to this end Nixdorf purchased expertise in the USA. The data collection system from the US company Entrex[18] was already established on the market and Nixdorf introduced this system in Germany as the 620 range in 1973. This system secured the company's turnover, especially in 1975, as incoming orders at that time showed "a clear shift in emphasis from 820 products to the 88 series disk

16 Nixdorf Computer AG, Annual Report 1968, p. 5.

17 BTA 5 (1968), Kleincomputer für direkte Datenverarbeitung, p. 263.

18 The cooperation resulted in Entrex merging with the US subsidiary Nixdorf Computer, Chicago in 1977. Nixdorf Computer, Chicago had started business on 1 January 1973 and emerged from the computer division of Victor Comptometer Corporation. In May 1977, Nixdorf Computer, Chicago took over Entrex, including its 60 offices in the USA and Canada, and around 600 employees. As a result, Nixdorf's US headquarters were moved from Chicago to Burlington.

systems",[19] but this changeover process from the 820 magnetic accounting computer to the new 8870 magnetic disk system required a start-up phase.

Utilizing the 620 system, Nixdorf not only secured the company during the upheaval phase of the storage changeover, but also, at the same time, was the market leader in the data entry segment for the next ten years both in Germany and the USA.[20] The competitors either offered data input systems without a screen, such as NCR or Kienzle, or the data had to be initially temporarily stored on floppy disks or magnetic tapes, as with IBM or Kienzle, and could only then be saved on magnetic disks. By contrast, the 620 system was not only technically competitive, as it was equipped with a screen and the data was saved directly on magnetic disks, but was also designed for high market penetration in terms of price.

4. From a niche to mass markets

Parallel to the challenging storage changeover, the market niche of offering computer solutions for small businesses directly at the workplace at a reasonable price/performance ratio had become a mass market. A few years earlier, only a few companies manufactured mid-range computers, for example, Wanderer/Nixdorf, Kienzle, Ruf-Buchhaltung, Philips, Olympia and Anker, but new companies had entered the market since the late 1960s. These included the musical instrument manufacturer Hohner[21] from Trossingen in Swabia, the US sewing machine manufacturer Singer with its Singer Business Machines Division and the German subsidiary Singer Computer GmbH in Nuremberg, and Computertechnik Müller (CTM) from Konstanz in Germany. The founder of CTM was Otto Müller, who had previously been instrumental in the development of the 820 at Nixdorf and, together with his wife Ilse, had taken the step of becoming self-employed after Nixdorf and other companies, such as Triumph-Alder Büromaschinen-Vertriebsgesellschaft, had refused to implement his new computer concept.[22]

19 HNF 3-Sg/0142, therein: Report of the Executive Board, third quarter 1975.
20 A good overview of the functional principles, characteristics, mode of operation and possible applications, as well as the state of the art in data acquisition is provided by Schleuder: Periphere Geräte.
21 Berghoff: Zwischen Kleinstadt und Weltmarkt, pp. 605–609.
22 Müller: Glanz und Elend, pp 153 – 261.

It was not only spin-offs and start-ups that entered this market from 1974 onwards. The established manufacturers of large computers, mainly from the USA, also offered mid-range computing systems. The German journal *Zeitschrift für Bürobedarf* noted: "The almost tumultuous reception that the cost-conscious user, plagued by accounting problems, has given mid-range computers in recent years is obviously something that the leading suppliers of large-scale EDP systems also want to profit from."[23]

Accordingly, these manufacturers advertised their products at the 1974 Hannover Trade Fair with slogans such as "Computer power at the workplace" (IBM), "The computer at the workplace – a utopia yesterday, reality today" (UNIVAC) and "Easy to use" (Honeywell Bull).

A general tendency towards smaller and decentralized computer systems was evident at this Hannover Trade Fair. On the one hand, the classic mid-range computer manufacturers, such as Nixdorf and Kienzle, offered further developments, so that magnetic disk storage technology and screens enabled new application possibilities and, thus, for the first time, the performance of a computer was brought to the workplace. On the other hand, the minicomputers of mostly US companies had become so inexpensive that they broke into the mid-range computer sector. In addition, peripheral devices, such as monitors, floppy disks and magnetic disks, were often originally present in the computers and did not have to be adapted first, as was the case with the original mid-range computers.

Users could not do much with low-cost computer power in everyday office life. They were used to receiving solutions tailored to their accounting problems from providers. However, the major IT manufacturers were only able to supply these software solutions on a rather modest scale in 1974. The German mid-range computer manufacturers, such as Nixdorf or Kienzle, on the other hand, were different. It was precisely in this segment that their strengths and advantages over IBM lay. Although the mid-range computers were less powerful than their US counterparts, these companies had years of experience in developing computer solutions for the everyday office life of small to medium-sized enterprises.

Being able to offer these solutions in everyday office life meant having solutions in the software sector at the ready. Here, NCAG was the trendsetter in the mid-range computer industry: "In its endeavour to offer comput-

23 Schulte, Otto: Computer für Anwender, in: Burghagens Zeitschrift für Bürobedarf (BZB) – Sachmagazin 6 (1974), pp. 10–12.

ers, operating systems, application programmes as well as after-sales service as a single unit within the scope of its services, Nixdorf has gone one step further. A software system developed on an international basis was presented in Hannover that opens up new perspectives for data processing in small and medium-sized enterprises. […] This programme contains all essential operations related to order processing, invoicing, materials management, payroll accounting, financial accounting, company accounting, production control and purchasing."[24]

It was also NCAG that clearly dominated the mid-range computer market in West Germany in the 1970s, ahead of Kienzle.

Provider	Total number of units of all deliveries	Share in per cent
Nixdorf	14,000	25.1
Kienzle	8,600	15.4
Philips	7,300	13.1
Triumph-Adler	6,800	12.2
Ruf	4,500	8.1
Akkord	2,400	4.3
NCR	2,200	3.9
Olivetti	1,900	3.4
Singer	1,700	3.1
Hohner	1,200	2.2
Burroughs	800	1.4
Other	4,350	7.8
Total	55,750	100

Graph 1: Installed inventory and manufacturer shares (start of 1974) of medium data systems in the Federal Republic of Germany[25]

24 Bürotechnik und Automation (BTA) 6 (1974), Nixdorf, pp. 714–716.

25 Table taken from Rösner: Wettbewerbsverhältnisse, p. 64. The fact that some of the Ruf systems were produced by Nixdorf must be taken into account.

The growing mid-range computer market provided sufficient leeway for the economic growth of almost all companies operating in the sector for some time. But equity investments, takeovers, mergers and corporate bankruptcies were to determine the scene over the next few years.

Some examples of the latter are as follows. The firm CTM became a Diehl Group company in January 1975.[26] At the turn of 1975/76, the Singer Company announced that it was dissolving the Singer Business Machines Division and getting out of the computer business. In April 1976, the British computer group ICL took over the Singer Business Machines Division shares.[27] Finally, Nixdorf bought Hohner's IT business on 1 January 1977. But that was only the prelude to a whole series of company acquisitions and shareholdings: "The list of the deceased and apparent dead is long: Alphadelta, Beaugrand Datentechnik, Bross Datensysteme, CMC, Compucorp, Compudata, Contidata, DDC Computer, Datasaab, Dietz Computer, ERA General Automation, Feiner Reichenelectronic, Hermes Precisa, Herzke KG, Hohner GDC, IG Industria Computer, Inforex, Interscan, ISE Sammentinger Electronic, Krantz Computer, Logabox, Mail, Montedison, Ruf, Schrem, Tealtronic and Wagner. Still alive as mid-market comforters – although they haven't exactly covered themselves in mid-range computing glory in recent years: Burroughs, CTM, Datapoint, Honeywell Bull, IBL, Kienzle, MAI, MDS, NCR, Philips, Sperry, Taylorix and Triumph-Adler."[28]

The negative list does not include Nixdorf. This raises the question of what the difference was between Nixdorf and the other manufacturers. Dieter Eckbauer, the long-standing editor-in-chief of Computerwoche, had the following opinion on this: "The success of Nixdorf Computer AG […] is clearly based on selling reliability through all-round support, everything to do with organization – no black boxes. […] Nixdorf knows how to deal with the owners and managers of small and medium-sized enterprises."[29] Accordingly, Nixdorf sold not only computing power in the form of a black box but also solutions for everyday office life, specially tailored to the needs of its customers. A pronounced customer orientation and industry focus on distribution were part of this.

26 Computerwoche 1 (1975), Diehl kauft CTM.

27 Computerwoche 1 (1976), Zurück zur Nähmaschine: Auch Singer wirft das Handtuch; Computerwoche 20 (1976), International Computer Limited: Singer-Produktion läuft weiter.

28 Eckbauer, Dieter: IBM: Sturm und Drang im MDT-Wasserglas, in: Computerwoche 49 (1985).

29 Ibid.

5. Nixdorf's response to the new challenges

NCAG's reorganization transformed it from a company with a focus on development into one which was sales-oriented. This is also reflected in the number of employees. While NCAG's development department increased by about 82 per cent from 1974 (695 employees) to 1986 (1,266 employees), the sales staff increased by 178 per cent (2,396 employees in 1974 to 6,655 in 1986). The expansion of the sales network was a consequence of the Board of Directors' strategy of taking the lucrative business into its own hands and forcing factory representatives and other customers of Nixdorf products out of the market. This strategy proved to be successful even in the economically difficult years from 1973 to 1976, as an increase in sales was generated by the company's own sales organizations, while, at the same time, long-standing cooperation agreements in sales, including with Ruf Buchhaltung, were terminated. One thing was certain for the Nixdorf board of directors: "The concept of accelerated expansion of our own domestic and foreign distribution organizations in recent years has, thus, proven its worth, even in a difficult economic period."[30]

The well-developed sales companies, which enabled a strong customer focus, brought NCAG profitable business in the 1970s and 1980s. The company's continued success was also based on the technical development of new systems, such as the 8870 computer system, which proved to be a bestseller for NCAG: "Heinz Nixdorf and his Nixdorf Computer AG have always been regarded as fast starters in the industry – and with a reputation for finishing what they started: a turnover of more than DM 600 million for 1975, a full order book and a 'popular range' are the keys to success. After a boom with the 620 data collection system, the Paderborn-based company now launched a second big seller: the 8870 magnetic disk system."[31] As a successor model to the 820, the 8870 magnetic disk system was aimed at the Nixdorf domain of mid-range computing, in other words, it was "designed for the SME market for which a magnetic accounting computer

30 HNF 3-Sg/0142, therein: Report of the Executive Board, first quarter 1976, p. 2. After Ruf Buchhaltung ceased to be Nixdorf's distribution partner, the company got into financial difficulties and was finally taken over in 1980 by the Swiss company Hermes Precisa International, which, in turn, sold its shareholding in 1983. Computerwochte 7 (1980), Ruf als MDT unter Hermes' Fittichen. Also see Computerwoche 9 (1983), Hermes Precisa kappt deutschen DV-Vertrieb.

31 BZB 2 (1976), Nixdorf erweitert Produktfamilie 8870, p. 62.

organization had become too small, but for which a larger system was not yet an option".[32]

In fact, within a year, the 88 product family systems had become the mainstays of NCAG' s sales and in the first quarter of 1976, "already accounted for more than 40 % of the total incoming orders of the domestic sales organization. […] This positive trend makes it clear that the new products have asserted themselves in the market even in the face of tougher competition".[33]

Nixdorf's competitors, such as Wang Laboratories, saw the strength of the Paderborn-based company in its tailor-made offers for everything to do with EDP: "That's why Nixdorf is so successful in Germany: users feel they have all-round support, they don't need to worry about what the hardware can do. They are offered a complete application solution."[34] Nixdorf offered corresponding user programmes for a fee, which included system maintenance. Programmes for data entry and programme packages for the commercial sector, stock level monitoring and ordering, as well as product requirement determination, bookkeeping and payroll fulfilled the customers' requirements.[35]

The market for office computers,[36] such as systems ranging in price from DM 25,000 to 250,000 from the mid-1970s, was generally a market with high growth potential.[37] It was precisely this potential that Nixdorf exploited with the 88 product family. The company was the undisputed leader in Germany in 1977 with 19,090 installations, followed by Kienzle with 6,500 and Philips with 6,000 customer-installed office computer systems. These were followed by Triumph-Adler (3,900 installed systems), Olivetti (2,800),

32 BZB 2 (1975), Das Nixdorf-System 8870 bietet eine problemlose EDV-Anwendung, pp. 10–12.

33 HNF 3-Sg/0142, therein: Report of the Executive Board, first quarter 1976.

34 This is what John F. Cunningham, Senior Vice President Sales of Wang Laboratories, said in 1978 in an interview with Computerwoche. Eckbauer, Dieter/Elmauer, Elmar: "In fünf Jahren größer als Nixdorf", in: Computerwoche 23 (1978).

35 BZB 2 (1975), Nixdorf System, p. 12.

36 In addition to the price segment, there were other criteria that defined an office computer: "Office computers are fully-fledged, screen-oriented EDP systems that, in addition to internal memories, have direct access to external mass storage (e.g. on magnetic disk) and can be used as single-user or multi-user systems. […] Today [1980] the term 'office computer' is understood as a collective term for small computer, minicomputer, mid-range computing system, small computer and others." Pleil: Bürocomputer in der Praxis, p. 5.

37 Computerwoche 43 (1977), Diebold prognostiziert Bürocomputer-Boom.

Ruf (2,700), Hohner (2,200), IBM (1,600, excluding System /32), Taylorix (1,300), CTM (1,020) and, with 830 systems each, NCR and Dietz.[38]

As has been mentioned earlier, IBM and other major IT manufacturers pushed into this industry with all their might because of the success of the mid-range computing manufacturers. Around the same time as the market launch of the Nixdorf 8870 in 1975, IBM presented a new computer system called /32. Although the Americans were late in adapting to the "user needs of the market", according to the trade press, "IBM's success with the /32 system should be assured: In the USA […] 2,000 units were sold in the first three months after the announcement there".[39] This predicted success was not long in coming. IBM was only in eighth place in Germany in 1977, with 1,600 /32 systems, but was "at the same time, the leader when it comes to the most installed machine in the first half of 1977: the system was installed 450 times. […] Nixdorf added 205 machines to the 8870 disk system. Kienzle brought a good 200 of the 6000/6100 systems into the field".[40]

IBM, thus, also prepared to take the market-leading position in the field of decentralized data processing, this term replaced the description 'mid-range computing' at the end of the 1970s. The /32 system was followed in 1977 by the /34 system, which was also aimed at the "Nixdorf domain"[41] and, similar to the 8870, was designed as a single or multi-user computer. IBM took its cue from Nixdorf not only in the computer structure but also in the pricing for the /34, and the saying "It was always a bit more expensive to choose IBM" no longer applied: "Nixdorf's price for an 8870/1 stand-alone system: DM 99,500. The comparable IBM 34: DM 98,610."[42]

In addition to IBM and the other large computer manufacturers, mini-computer manufacturers such as Digital Equipment Corporation and Hewlett-Packard entered the field of commercial data processing from the mid-1970s onwards. Although these manufacturers only offered customers the hardware and not a complete package (hardware, software and maintenance) like Nixdorf or Kienzle, these computers cost only about half the price. Since customers in the commercial sector could do little or nothing with the hardware alone, these manufacturers advised that they involve

38 Computerwoche 45 (1977), IBM hält Platz acht im Bürocomputer-Markt.
39 Computerwoche 16 (1975), IBM steigt mit System /32 in den MDT-Ring.
40 Computerwoche 45 (1977), IBM.
41 Computerwoche 17 (1977), System /34: Späte Reaktion auf dem Markt.
42 Computerwoche 18 (1977), IBMs System 34 wird einen Preisverfall erzwingen.

a software company to carry out the programme installations desired. Alternatively, the software companies went directly to the mini-computer manufacturers, bought the hardware there and offered it on the market with user-specific software. All in all, an approach such as this meant a cost advantage over the complete solution offered by IBM, Nixdorf or Kienzle.[43]

Barely two years after the market launch of the 8870, competitive pressure in the mid-range computing and decentralized data processing sector had increased further. In order to remain competitive in the market, the development of a new operating system was imperative for Nixdorf. This was released for distribution under the name Comet in 1978.[44] Comet was a piece of industry-independent software that could be adapted to the individual needs of the customer. The software was advantageous for technical customer service because a special system structure meant that there was no need for time-consuming programming and it was possible to respond quickly to customer requests.[45] With Comet, NCAG once again emphasized customer focus and "this orientation towards a system and software provider created a competitive advantage for Nixdorf which, as market observers attest, made customers overlook even temporary weaknesses in the hardware and whose durability is also reflected in the fact that the software existed longer than Nixdorf itself."[46]

Accordingly, in the long term, Comet strengthened Nixdorf's position in the overall business of decentralized data processing. However, it can only be concluded to a limited extent that this software was what made Nixdorf a system provider in the first place, because NCAG had already gone down this path before and, as described, had different programme packages on offer. Comet was, therefore, rather the consistent pursuit of the strategy of offering hardware and software from a single source, which, in turn, corresponded to the customer's wish to have only one contact person for the seemingly unfathomable EDP.

The 8870 office computer system clearly became the company's main revenue generator in the 1970s and 1980s. Together with Comet software, Nixdorf remained the industry leader in decentralized data processing in Germany. However, the rapid growth of the company was not solely

43 Heitz, Christoph: Wo liegt das Geschäft der Mini-Computer-Hersteller? in: Computerwoche 26 (1977).

44 HNF 3-Sg/0142, therein: Minutes of the meeting of the Supervisory Board of Nixdorf Computer Aktiengesellschaft, 20 November 1978.

45 Leimbach: Die Geschichte der Softwarebranche, pp. 200–201.

46 Ibid., p. 201.

driven by office computer systems. Nixdorf was able to achieve high sales growth rates of 15 to 20 per cent annually, especially with computers and solutions for the retail sector (cash register systems/point of sale systems), banks (bank automation/automatic teller machines) and communications technology (data telephones).

6. An abrupt end

The Nixdorf company was at its zenith in the mid-1980s. At this time, the press reports about the entrepreneur Nixdorf seem like court reporting. The headlines "He 'came, saw and conquered'",[47] "The gnarled patriarch of electronics"[48] or the "Economic miracle in Westphalia" are representative examples. But the golden age of Nixdorf Computer AG came to an abrupt end with the death of the company's founder in 1986.

Similar to other manufacturers of mid-range data technology, Nixdorf had underestimated the technical development of the PC and, thus, initiated the downfall of his company.[49] He had failed to recognize the changing market conditions and held on to the outdated technology of the 8870 computer for too long instead of placing the PC at the centre of his office systems.

The breakthrough of the PC had undeniably influenced the negative economic development of NCAG after Nixdorf's death in the late 1980s. There is no doubt that Heinz Nixdorf had a wait-and-see attitude towards the PC. But NCAG's portfolio included IBM-compatible personal computers with the 8810 system family from 1983. From 1985 onwards, MS-DOS[50] was used as the operating system and in 1989, NCAG achieved a turnover of about

47 Markt & Technik. The Weekly Newspaper for Electronics and Information Technology 42 (1985), Er "kam, sah und siegte". "Corporate Identity" und Managementstrategie bei Nixdorf, pp. 36–39.

48 Grunenberg: Der knorrige Patriarch, pp. 211–221. Grunenberg's article on Nixdorf appeared in the weekly newspaper Die Zeit on 10 August 1984 and was published in the anthology mentioned here in 1993. A paperback edition appeared in 1995.

49 Nixdorf: Ohne Partner chancenlos, in: Der Spiegel 52/1989, S. 84–87.

50 See Computerwoche 44 (1985); Kooperation zwischen Nixdorf und Microsoft; Elektronische Rechenanlagen mit Computerpraxis (eR) 6 (1985), Zusammenarbeit zwischen Nixdorf und Microsoft, p. 356: "The focus of the cooperation is the use of operating systems and application solutions from Microsoft in the Nixdorf product family 8810. [...] Microsoft has been installing 8870 systems since mid-1985. Scott Oki, vice president of international operations for Microsoft commented: 'We chose Nixdorf primarily because of the strengths of the Comet software.'"

DM 500 million with PCs. A change in the competitive situation in increasingly competitive international markets also played a decisive role. Similar to many other computer manufacturers, the Paderborn-based company was not making any profits from the sale of PCs, as fierce competition and price erosion had set in at the end of the 1980s in the industry, which was not accompanied by price reductions in the computer components purchased by PC manufacturers.

In retrospect, a market strategy oriented towards the PC, as so often rumoured, would not have been an alternative. Growth rates of 20 per cent were the rule in the PC industry around 1990, but all the computer companies involved, whether established for years, such as IBM, Sperry, Burroughs or Wang, or newcomers, such as Digital Research, Digital Equipment Corporation, Commodore and Compaq, found themselves in constant cut-throat competition, which was subsequently accompanied by concentration processes. If one assumes that NCAG should have concentrated more on the sale of PCs from 1983 onwards, it might have been possible to increase sales, but this would not necessarily have led to an increase in profits due to the fall in prices. Instead, it appears that only a radical reduction in personnel, standardized operating systems on all Nixdorf system families, more intensive marketing of the Comet software and a concentration on the areas of cash register, banking and communication systems, i.e. on products that could have been produced competitively in Germany at that time, might have enabled the entire Nixdorf company to survive in the 1990s.

On 1 October 1990, Nixdorf Computer AG was merged with the data and information technology division of Siemens AG. The resulting Siemens Nixdorf Informationssysteme AG, with about 52,000 employees and an annual turnover of about DM 11.5 billion, was the largest data processing company in Europe at the time, but only lasted in this form until 1999. Like so many companies, it became a victim of the concentration processes in the computer industry, so that it was split up into several successor companies. The best known were Fujitsu Siemens and Wincor Nixdorf, merged into Diebold Nixdorf in 2016.

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