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How Was Present-Day Ericsson born?

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Abstract. Present-day mobile telephony was created by the Nordic public telecommunications companies. Its foundation was laid in genuine Nordic cooperation in the development of the NMT standard, "mother" of modern mobile telephony, in 1969–1981. Absolutely crucial for success, the NMT group designed a solid and reliable system architecture for mobile calls and boldly took the step to opt for intelligent terminals. Other decisive elements included roaming and hand-over and the principle of handing the technology over to the rest of the world, free of charge.

Later, this attitude led Ericsson and Nokia to victory in the "world wars" that were later fought over the technology standards for 2G, 3G and 4G. In our view, the core in the Nordic view on technology, society and man can be summed up in terms like transparency, nerdy attitude, result-orientation and team power. Culture will beat strategy, every time, and these characteristics explain the Nordic countries' dominance in telecommunications development.

Keywords: History of telecommunications, Nordic countries, NMT, mobile communication technology standards, Ericsson, Nokia

1 The Land of Naive Nerds – Some Historic Roots

One cannot talk about the history of information technology without talking about nerds. For a start let us dwell a moment on the subject. Towards the end, we will comment why the topic of nerds is relevant also when trying to understand Ericsson.

The first nerd was Anders Chydenius (1729–1803), the primary advocator of the principle of transparency. He is a strong candidate for the post. Son of a clergyman, and later priest himself, he spent his childhood in the Kemi-Lapland wilderness, the northernmost pastorate in Finland.

Anders Chydenius wrote his Master's thesis about Canadian birchbark canoes – the ones that we now call Native American canoes – and built them himself and tried to interest his parishioners in building ones, too. He developed a first-class nerdship in the art of argumentation and eloquence – no-one could beat him on that point. For instance, in the pamphlet *Den nationnale winsten (The National Gain)*, published in 1765, he presented roughly the same theoretical framework as Adam Smith – eleven years before Smith's *The Wealth of Nations*.

In 1765, Anders Chydenius was elected as one of the 57 ecclesiastic members of the Swedish Riksdag of the Estates, an unknown chaplain from a little parish from the back of beyond, with the lowest status in the company of high-ranging parsons and bishops. But before the Riksdag of the Estates was over, he was a much feared politician and had changed the Swedish constitution for good.

To put it briefly, he pushed through the world's first decree on the freedom of the press and introduced the principle of transparency in Sweden, as the first country in the world. Since then it has been one of the foundation pillars in the Swedish-Finnish nation: the decision-making process should be transparent and everyone should have access to any information.

The second nerd was Abraham Niclas Edelcrantz (1754–1821), who introduced the digital principle in communication. Maybe Abraham Niclas Clewberg, born in 1754 in Åbo (Turku), docent in physics and the history of literature at Åbo Akademi University, at the age of 19. Later he was promoted the head librarian at the university, but as often was the case with gifted people, he soon moved to Stockholm.

He became King Gustav III's private secretary, first director of the Royal Theatre, superintendent of the Royal Museum, chairman of the Board of General Fire Insurance Institution and member of the Swedish Academy and all the other contemporary academies in Sweden.

In 1789, he was knighted and adopted the name Edelcrantz. But first and foremost, he developed the first signalling system along the lines of the digital principle, in other words, information based on the digits zero and one. Inspired by the ideas of Frenchman Claude Chappe, Edelcrantz developed an optical telegraph line that was inaugurated in 1794 and connected Sweden and Finland. Figure 1 is a photo of a replica installed in Furusund.

Juha Heinänen was the first to use the Internet in Finland. In 1983, he introduced the first e-mail connection from the University of Tampere to Sweden, in 1986 he got the permission to administer Finnish Internet addresses and in 1988 he established the first fixed line Internet connection to Finland.

Jarkko Oikarinen, who in his summer job at the IT Centre of the University of Oulu in 1988 developed the first chat network over the Internet, IRC, Internet Relay Chat – which is still alive and well. At present, he is working for Google in Stockholm.

Another example is a group of students, viz. Teemu Rantanen, Kari Sydänmaanlakka, Kim Nyberg and Kati Suominen, who developed the first graphical web browser, called Erwise (figure 2). Erwise was developed in 1991 to 1992 as a Master's project at the Helsinki University of Technology, with Tim Berners-Lee as the instigator.

The web browser allowed one to open a new website by clicking the mouse on a marked hypertext link. One could search text on the website and download multiple sites simultaneously. It even had a function that was to lay the foundation for Google later on: If the word you were searching for was not found on the website, the browser started looking for the word on other websites.

Unfortunately, the economy was in deep recession in Finland in 1992. Tim Berners-Lee chose Viola web browser and there was no-one to develop Erwise. Instead, the Erwise gang gave part of its code to Mosaic, later Netscape.

Two more Finnish pioneers are Linus Torvalds – needs no further presentation, we presume – and Michael Widenius – called Monty, from Helsinki. He is the main author of the code for the original MySQL, a database system based on open source, a parallel to Linux. MySQL was bought by Sun Microsystems in 2008, for a billion dollars.

In conclusion: Finland and Sweden, like the rest of the Scandinavian countries, have one special success factor that is seen over and over again: the attitude of the naive nerd. An attitude that may sometimes seem conceited, in the belief that one is capable of solving all the problems by oneself, but it also has an aspect of generosity: one shares with others.

The best results are achieved when everyone is pooling their know-how and sharing their ideas. Preferably, the solutions should be so functional and inexpensive that everyone can use them. Paying for exclusiveness is not first and foremost in the list of priorities.

In our book on Ericsson, *Changing the World*, we identify this view as the winning formula also in the case of telephony. The first example is a list of the cities with the highest proportion of telephones in the world in 1885:

Table 1. Inhabitants and telephone subscriptions in 1885

| | Population | Subscribers | Percent |
|------------|------------|-------------|---------|
| Stockholm | 215,000 | 4,832 | 2.25 |
| Helsinki | 46,000 | 575 | 1.25 |
| Kristiania | 144,300 | 1,629 | 1.13 |
| Copenhagen | 214,000 | 1,336 | 0.49 |
| Berlin | 1,280,000 | 4,248 | 0.33 |
| Paris | 2,800,000 | 4,054 | 0.14 |
| London | 4,765,000 | 4,193 | 0.09 |

The other example shows the highest proportion of mobile telephones exactly one hundred years later in eight European countries, see figure 3.

The Englishman Alfred Rosling Bennett, who was the leading authority on telephones in Europe in the 1890's, concluded that the benefits of telephones would be the greatest if they were made available as easy and inexpensive as possible, as was done in the Nordic countries. In 1895, this is what he wrote in his book *The Telephone Systems of the Continent of Europe*:

"There would seem to be something in the Scandinavian blood, which renders the possession of many telephones as essential to their owners' happiness. Wherever two or three Swedes, or Norwegians, or Danes, or Finns of Scandinavian descent, are gathered together, they almost infallibly proceed to immediately establish a church, a school, and a telephone exchange. Whatever else in life that is worth having generally comes after."

2 The Birth of Mobile Telephony – the Death of LME

1969 was a year of liberation and trust in the future. Friday, 27th June 1969, the day before Midsummer Eve, gave many examples of this.

In New York, police raided Stonewall Inn Gay Bar – which resulted in three days of riots against the police. This incident marks the beginning of Pride parades all over the world. The same day the song *Je t'Aime Moi Non Plus* with Serge Gainsbourg & Jane Birkin was released in France. You are sure to remember it. Also in Great Britain, it was a memorable day with the first launch of Black Arrow, the carrier rocket that later placed the first British satellite into Earth orbit.

Soon after this, Neil Armstrong stepped on the surface of the moon. A little later that summer, it was time for Woodstock Music & Art Fair.

But the most important event on 27th June, 1969, took place in Kabelvåg on Lofoten Islands in Norway, and witnessed the foundation of modern mobile telephone, at Vågans community college.

It took place at the venue for the 34th Nordic telecommunications conference. No participants from LM Ericsson were attending, and none from Nokia either, because at this time they didn't give a thought to mobile telephony. All the delegates represented the Nordic PTTs.

When they got to the last item on the conference agenda – “Any other business” – Carl-Gösta Åsdal asked to speak. He was the chief radio engineer at the Swedish PTT and he proposed that the Nordic PTTs should consider joint mobile telephone solutions.

And that was what the conference decided to do. Twelve years later, we see the launching of NMT (Nordisk Mobil Telefon, *Nordic Mobile Telephony*), the mother of all consequent mobile telephony. Here just a couple of brief comments:

- **NMT represents the Nordic mindset**

A Nordic conference such as this one proves that such a thing still exists. In fact, Nordism reached its climax officially around 1970 in a treaty called Nordek that proposed Nordic economic cooperation, as an alternative to the European Economic Community, EEC.

But only days before the treaty would be officially ratified, it lapsed because of power politics. But the mindset was established: The Nordic countries formed an entity, and their cooperation was taken for granted.

- **NMT was an engineering dream-come-true**

NMT was such a success because – and so say all of those who were involved in it – of the fact that the engineers were allowed to work by themselves and politicians never interfered or meddled with their work.

It was simply because the politicians did not understand the potential of mobile telephony. In other areas, they tried to control issues in great detail – as in the case of data cooperation and TV satellites – but without any great success.

One example on how the NMT group made a conscious effort to keep “off the radar” is their task description. From the very beginning, the young radio technicians were planning a *joint Nordic mobile telephone system*”.

The first draft was written by the NMT Chairman Håkan Bokstam. After some modifications the central sentence said (in Swedish), that the purpose was to create *"compatible Nordic public mobile telephone systems, possibly a joint system"*.

It can be difficult today to fully understand how bold the NMT project was. For instance, a system crossing national borders would have been unthinkable in any other part of the world. At this time, people were not even allowed to take a radio transmitter with them across the border without a special permit – a legacy after the war: one was viewed as a potential spy.

- **NMT expressed a complete concept**

This is the absolutely most important document in the NMT process, see figure 5: It is the list of the fourteen operational requirements for NMT. They were put down by Håkan Bokstam in his hotel room in Oslo the day before the NMT meeting on 20th January, 1971. These requirements came to be called "the fourteen commandments" that every solution in the mobile telephone system had to comply with. One of the commandments was formulated like this:

"automatic searching of mobile subscriber [...] registrates under which base station the subscriber is located" ... meaning roaming.

Another commandment was formulated like this:

"automatic transfer of ongoing call from one base station to the next base station" ... meaning handover.

- **Everything was transparent, know-how was shared**

The NMT group had over one hundred meetings. Everyone contributed for the common good, there was no national rivalry. The participants spoke Scandinavian – a mixture of Swedish, Norwegian and Danish. Despite occasional protests from the Finns, the majority refused to switch to English.

There was never a question of applying for patents for the NMT inventions. On the contrary, they were offered free of charge to the rest of the world. It turned out to be a problem later on when Motorola, Qualcomm and others claimed patents on inventions that the NMT group had already developed years before. The NMT group had to dig deep in their archives to prove that they had, in fact, been first to the mill.

- **The subscribers should own the equipment**

The NMT group stood behind this principle from the very beginning, mobile telephones should not be owned by the PTTs, as was the case in landline phones.

Therefore, the group invited manufactures, such as LM Ericsson and Nokia, to develop devices and equipment, based on the NMT specifications. It was more due to practical than ideological reasons, the PTTs would never have invested the kind of money that was needed in product development.

The NMT system was launched in the Nordic countries between October 1981 and March 1982, and it was an immediate success. It aroused a lot of interest internationally, and in June 1982 eight prominent figures of the NMT group were invited as guests of honour by British Telecom and France Telecom. These two telecom operators had just before published their plan of a joint British-French NMT service.

NMT was later adopted in about 50 countries. But, as we well know, NMT-plans in France and England did not materialize. Europe recognized that the NMT system

was superior to all of the other contemporary mobile telephone systems. But because of envy and competition, they started to develop rival analogue mobile systems. None of them were any match for NMT.

The Northeners' next success was the GSM standard (originally Groupe Spécial Mobile, a working group within *Conférence européenne des administrations des postes et télécommunications*, CEPT, the European Post and Telecommunications Conference). The GSM standard can be described as a digital version of NMT, added with a SIM card. **Thomas Haug**, a Norwegian working for the Swedish PTT, played a very important role, first as the chairman of the NMT group and later, for an entire decade, from 1982 till 1992, in charge of the GSM process, leading to its enormous success. Today, Thomas Haug is 87 years old and lives in Sollentuna, to the north of Stockholm.

What about LM Ericsson's role in all this? In short: they were struggling against it. Mobile telephony was seen as something strange and uninteresting business-wise. The relationship towards PTTs was overbearing.

Just one example: AXE, this fantastic exchange that Televerket and LM Ericsson had developed together. The NMT people wanted to use AXE for their mobile telephone system – they needed to maximize the intelligence of the exchange to keep down the complexity of the base stations. But LM Ericsson, the only supplier, refused – in their view, AXE was over-dimensioned for such a marginal thing as mobile telephony.

LM Ericsson had to be heavy-handedly forced down the aisle. It was done by Televerket's new director-general, Tony Hagström. In a meeting where no minutes were kept, the directors-general of the Nordic PTTs decided to place their procurement contracts with Nordic suppliers.

The Finnish PTT had already placed an order for its exchange with the Japanese NEC. The Finns managed to worm their way out of the contract by adding a new cost item to the economic calculation, "*hallinnolliset sovituskustannukset*" – "administrative adjustment costs". It made NEC more expensive than LM Ericsson.

LM Ericsson's attitude had fatal consequences. By the turn of the Millennium, the income generated by landline telephony had dropped to a fraction of former figures. To put it bluntly, mobile telephony was the reason for LM Ericsson's death.

3 The New Ericsson – King of the Standards Game

Ericsson as a company is still alive and well, despite everything. The explanation spells SRA and its employees who were long described as amateurish cowboys.

SRA, Svenska Radioaktiebolaget, was founded in 1919 with LM Ericsson as one of its many shareholders. Its purpose was to develop radio communications in Sweden, first and foremost because of military reasons. In order to acquire the required competence, Marconi was invited as a major shareholder.

In the early 1980s, there were only two shareholders left: Marconi and LM Ericsson. At that time, the Swedish Army was SRA's biggest customer, and SRA had developed a special competence in radars and putting together radio telephony solutions.

The present-day Ericsson emerged within SRA. One figure gives a perfect illustration of this fact: in 1980 SRA's billing was 400 million Swedish crowns, in 2000 Ericsson billed 200 billion crowns for mobile telephone (and 73 billion crowns for other business).

It is 500 times bigger than in 1980 and corresponds to a 40 per cent increase in twenty consecutive years. No Swedish company has, before or since, been able to present such growth figures.

During the course of these events, Marconi's shares had been acquired by Ericsson, and mobile telephone had become the overwhelmingly dominant business in Ericsson that had undergone a total change.

What is the explanation? In part, Åke Lundqvist, CEO at SRA from 1977 till 1987, in many ways a rebel who was driving crazy the managers working for the big brother, LM Ericsson. In our opinion, he can be described as the founder of the present-day Ericsson. These are some of the decisive issues that he pushed through:

- to sell **complete mobile telephone systems** to the customers, instead of forcing the customers to put together the systems themselves
- to enter **new markets**, first and foremost the USA – against the express wishes of the Group management SRA learnt all about the American standard AMPS in a short time and conquered 30 per cent of the market share.
- to find **devoted nerds** who worked all hours of the day with technology development: this was how Ericsson, through SRA, stepped in the GSM technology (and, it must be said, by ignoring turf boundaries and cooperating with the nerds at Televerket)
- to develop small **hand-held telephones**, first for NMT in 1987, and later for GSM in 1992. It is fascinating that it happened at the exact same time as Nokia launched its corresponding telephones.
- to learn **how to sell** telephones.

Simultaneously with all this, through its presence all over the world – in 180 countries – the SRA people gained solid experience of a very essential skill: how to play the standards game, meaning the technical standards that any future solutions will be based on. Naturally, everyone wants to have solutions based on the technology where one feels strong.

In our book *Changing the World* we describe the development of mobile telephony as a play around standards, in four acts, where 1G turns into 2G which turns into 3G and the present-day 4G.

They could be called four "wars" where the Nordic countries have each time beaten the USA. In the battles on 2G, 3G and 4G, Ericsson has been the dominant warlord. In the 2G and 3G wars, Ericsson was accompanied by its faithful partner Nokia, but in the 4G war Nokia chose to take its own path. We wonder if it turned out to be one of the reasons for Nokia's sad fate in the mobile telephone business.

NMT clearly demonstrates the importance of a joint technology standard. As we mentioned earlier, the Nordic countries agreed on the fourteen commandments on how to build up their system architecture. Thanks to this understanding and shared values, the Scandinavians created an arena where **everything worked** in the system and where the actors could compete with cards on the table.

Ericsson and Nokia found each other in this: the NMT commandments tallied with their genes and by acting in unison, they could control the play around the standards. This was especially obvious in the case of the 3G standard UMTS, where in the autumn 1997 Ericsson and Nokia went as far as to seek support from the operators in a joint roadshow (where they handed out pens as shown in figure 4).

In January 1998 they raised their champagne glasses for a toast in both the companies after ETSI, the European Telecommunications Standards Institute, had decided to adopt UMTS – whose radio access technology WCDMA is a direct descendant of the GSM track.

All this resulted in Bill Gates's visit in Kista a couple of weeks later, in February 1998. He wanted to cooperate in an operating system for mobile phones. But he came one day too late – Ericsson, Nokia and a couple of others had signed an agreement on Symbian the day before.

Less than ten years later, in November 2007, the 4G standard was clear, when the American operator Verizon decided after three years of secret discussions with Ericsson, to abandon the CDMA and Wimax tracks and, instead, go for LTE.

For some reason, which we are not familiar with, Nokia had at this stage decided to follow another road.

One example of the two companies' different choice of roads relates to touch screens. Ericsson wanted, early on, to go for touch screens – you are sure to remember the old Ericsson mobile phones that one could use with a pin. Ericsson's problem was that it was much too little a player for global launching in the case of mobile phones. Such a move had to be taken together with another actor – Nokia, of course, a very familiar company for the Ericsson people.

Nokia had developed its own technology for touch screens but, for some reason, did not believe in it and rejected Ericsson's invitation. Jan Uddenfeldt, Ericsson's former technology manager has talked about the profound disappointment this meant for Ericsson:

"It's an awful shame that Nokia never realized what they had missed. They stubbornly and repeatedly said no to touch phones. Had they accompanied us on that road, later events could have been different. When Apple launched their Iphone in 2007, it was too late."

In that case, was Nokia's fall a result of their breaking away from their roots? Did they not understand or acknowledge the strength of the Nordic genes?

Did they want, because of resentment, to draw away from Ericsson? It is well-known that Nokia's management got a trauma to struggle with when the company was in 1991 offered for sale to Ericsson, and Ericsson did not want to buy Nokia.

Had Nokia and Ericsson been able to develop a smartphone by 2007 that would have made Iphone unnecessary?

In our opinion, Steve Jobs managed to accomplish something that is actually a Nordic speciality: to develop easy and user-friendly devices.

Today, Ericsson and Nokia have sold their mobile telephone businesses to Sony and Microsoft, respectively. So in the present situation, Ericsson and Nokia are, in a way, in the same situation. To conclude with, here are some of Ericsson's success factors:

- **Transparency – access**
 - which is visible in a wide range of phenomena, for instance public right of access, the principle of publicity, open source, the approach that is summarized as FRAND (open for everyone to use, based on fair, reasonable and non-discriminatory terms).
- **Nerdy attitude**
 - with a passion to solve impossible problems
- **Result-orientation**
 - matter-of-fact, well-thought-out, a comprehensive view
- **Team power**
 - an inclusive attitude, ”take everyone aboard”
- **The role of culture**
 - culture will beat strategy, every time

Without a doubt, culture is the most decisive factor. To summarize:

Ericsson’s success has been based largely on what we would describe as a Nordic “mindset”. The culture provides the strength. The approach is to create solutions that can be used by everybody. The end-users are ordinary people. The technology has to function reliably, safely and without any fuss.

We describe these values as Nordic because they are clearly central to the Nordic countries. In 1748, **Montesquieu** placed the “source of liberty” in Europe’s northernmost countries. In a harsh climate, the effective use of resources and reliance on the individual were survival factors.

Consequently, trust and the availability of information are factors that offer the best chances of survival. Transparency, objectivity and the avoidance of verbal extravagance enhance possibilities. A group has access to broader knowledge and more skills than any individual.

Long-term planning is stronger than the short term view. Openness outperforms protectionism. Simplicity will trump complexity. The principle of “everyone on board” is more powerful than “involve a chosen few.” Culture will beat strategy – every time.

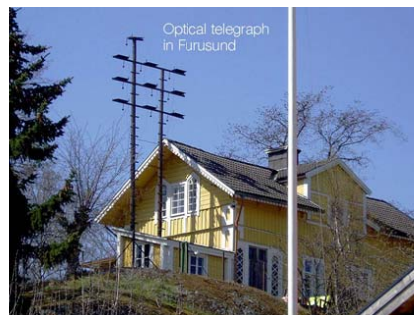


Fig. 1. Replica of Edelcrantz’s system was installed at Furusund in Furusund in the Stockholm archipelago.



Fig. 2. Erwise, the first graphical web browser.

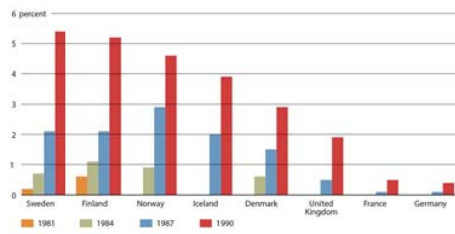


Fig. 3. Cellular penetration in the analogue era (1981–1990).

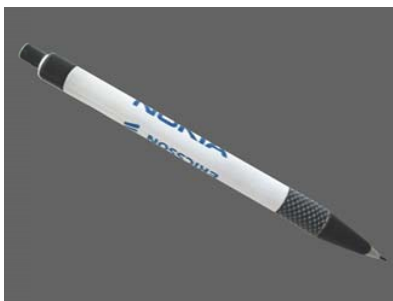


Fig. 4. The pen that Ericsson and Nokia handed out in a joint campaign directed at telecom operators world-wide in the autumn 1997.

Gruppen diskuterade huruvida man kunde förvänta sig en strävan att få till stånd ett europeiskt mobiltelefon-system. Man ansåg att stora svårigheter torde finnas att nå enighet om radiofrekvenser, signalsystem m m och att arbete på ett gemensamt europeiskt system måste bli mycket långsiktigt. Möjligen skulle en något mindre ambitiös målsättning innebärande endast begränsad kompatibilitet ha bättre förutsättningar att leda till resultat.

Som en vägledning för det fortsatta arbetet ställde gruppen upp följande lista över preliminära operativa grundkrav på ett nordiskt automatiskt mobiltelefon-system:

- 1 Systemet skall kunna utföra automatisk uppkoppling och taxering såväl till som från mobilstationen på grundval av valda siffror.
- 2 Samtal skall vara möjligt från mobilstation till godtycklig fast telefonabonnent inom samma land eller i annat godtyckligt land och vice versa.
- 3 Samtal skall vara möjligt då fordonet befinner sig vid sin hembasstation eller vid annan systemet tillhörig basstation i abonnentens hemland eller i något av de övriga nordiska deltagarländerna.
- 4 Samtal mellan två fordon skall vara möjligt oavsett om dessa befinner sig vid samma basstation eller vid olika basstationer även om dessa ligger i skilda nordiska länder.
- 5 Systemet skall utformas så att taxering kan ske med hänsyn till A- och B-abbonenternas aktuella positioner.
- 6 Abonnentkapaciteten skall vara tillräcklig för en längre period, både vad gäller radiokanaler och abonnentnummer.
- 7 Systemet skall, om det är tekniskt och ekonomiskt möjligt dels medge automatisk sökning av mobilabonnent i hemlandet och gärna även i de övriga deltagarländerna, dels också kunna registrera under vilken basstation abonnente befinner sig.
- 8 Systemet skall, om det är tekniskt och ekonomiskt möjligt, medge automatisk överkoppling av pågående samtal från en basstation till en angränsande basstation då fordonet förflyttar sig mellan de båda basstationerna.
- 9 Användningen av den mobila telefonen bör så långt möjligt likna användningen av telefon i det fasta nätet.
- 10 Säkerheten i systemets nummeröverföring skall vara tillfredsställande. Detta gäller i särskilt hög grad i samband med den automatiska taxeringen.

Fig. 5. Basic principles for mobile telephony described in the NMT agenda in 1971. Today it is dominant world-wide.