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**PRIVATE AND PUBLIC INTERESTS IN THE
DEVELOPMENT OF THE EARLY SWEDISH COMPUTER
INDUSTRY**

Tom Petersson

(Uppsala university)

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Introduction

In the aftermath of World War II, the international office appliance industry underwent some major structural and technological changes. Generally speaking, a number of American enterprises, among them IBM, Remington Rand and NCR (National Cash Register), had dominated the industry since the late nineteenth century. They were not only the largest producers on the world market, but also, still generally speaking, the leaders in creating and implementing new innovations within technology, organization and marketing and sales. In the 1940s and 1950s, some of the American enterprises gradually transformed themselves into producers of computer hardware, software and, not least, systems of computer power. IBM was without a doubt especially successful in making use of its specific organizational capabilities, in particular its market organization, and had by the mid 1950s developed global dominance within the new industry; i.e. the industry for commercial computers and for computerized systems gathering and processing massive bulks of information. The American example, based not only on the initiatives and efforts of private enterprises but also on a strong government contribution in the form of purchasing orders for computing power and (to a lesser extent) of research funding, had a number of counterparts in Western Europe. In Britain, Germany, Holland, Italy and Sweden, more or less successful attempts were made to establish new computer enterprises, or to transform already existing enterprises into computer producers.¹

Two Swedish enterprises, *Facit* and *Saab*, made such attempts from the mid 1950s and on, but from rather different point of views. Since the 1920s Facit had produced and sold office appliances, and it was at this point strongly export-oriented; more than 60 percent of its production was sold on foreign markets.² Saab, on the other hand, was almost entirely oriented towards the domestic market and had since its establishment in 1937 mainly been devoted to the production of military aircrafts, a kind of commissioned work since the Swedish state was the primary purchaser of the aircrafts. Since 1949 Saab had also, but on a much smaller scale, begun to produce cars.³ However, both companies – Facit and Saab – depended heavily on the Swedish government concerning their ambitions to establish themselves as producers of computers. The Swedish government itself, together with several governmental and semi-governmental bodies, such as the

Swedish Defense Research Agency⁴, and state-financed universities, such as the Royal Institute of Technology⁵, played an important role in the establishment and development of the Swedish computer industry, not least as intermediators and/or suppliers of human capital and know-how and of technology, and through placing purchasing orders for computing power on the Swedish market.

This chapter will describe the establishment and development of the Swedish computer industry from World War II to the early 1970s, and it will illuminate the mutually beneficial relationship between public (state) interests and private interests, the latter understood as private enterprises. In this lengthy process, two rather dissimilar interests eventually merged into one. The public, or state, interest was primarily motivated by security policy and military considerations, as the Post-War period gradually turned into the Cold War. Sweden was, from this perspective dependent on the transfer of American technology and know-how. More downright profit-interests were, obviously, the prime incentives for the private enterprises to get invested in the new business of computers and computer power. This study focuses primarily on Facit's actions and role in this development, partly due to the fact that both the role of governmental initiatives and of the other private enterprise, Saab, has previously been the subject of extensive research.⁶ The sources for this study are mainly internal memos and business correspondence from the Facit enterprise.⁷

The merging of public and private interests

In order to better understand the case of the early Swedish computer industry one must consider both the development of the international office appliance industry and the intimate and mutual dependence between public and private interests in the US as the computer industry began to evolve after World War II. With regard to the latter, several scholars have concluded that a large number of American enterprises benefited enormously from the World War II efforts, and later from the Cold War, especially those enterprises that in some way or another were connected to the large-scale military projects funded by the US government.⁸ Philip Scranton has recently put forward some propositions about business, government and innovation in the post-World War II period and the changing characteristics of American big business. Whereas American enterprises during

the nineteenth and early twentieth centuries, i.e. the Second Industrial Revolution, first and foremost sought to meet or anticipate and stimulate specific demands, the national security state and its concerns took the lead from World War II through the Cold War. In other words, the *market process* as the prime force behind the American enterprises' continuous ability to innovate and their (successful) attempt to conquer the world markets – as the core component in the United States' drive towards global economic and industrial leadership from the late nineteenth century on – was in the Post-War period replaced by a *state-led* or *state-propelled process*.⁹

The proposition of state-led innovation and development thus challenges, or at least questions, the much more market-oriented 'Chandlerian' perspective that for decades has been considered the hallmark and key explanation of American big business in general and its dominance within the computer industries and consumer electronics specifically. Hence, it was not only their ability to innovate and to organize production, marketing and sales in new ways – i.e. their technical, development, production, marketing and managerial capabilities as Alfred D. Chandler puts it – that made the American enterprises superior to their competitors all over the world.¹⁰ The direct and indirect support from the US government was just as important.

What then did the government do, that in fact promoted the development of American big business? Firstly, the attempt to meet the 'Fascist challenge', and later the 'Communist challenge', caused the state-centred technological problem setting to shift character, from occasional to routine. Secondly, in relation to the establishment of a new computer industry, the US government made serious attempts to create a long-term and constructive dialogue with a large number of domestic industrial enterprises and the academic world in order to carry out large-scale projects. State agencies, such as NASA and the CIA, thus initiated and created projects and not, as elsewhere, for example in Britain, state-owned enterprises.¹¹ Furthermore, in line with this policy, the government formulated performance requirements, funded research on a massive scale and put out purchase orders for computer power. The private enterprises within the office appliance industry were thus engaged in the development of computers, with massive engineering and managerial efforts, but without having a traditional market demand, or traditional

market signals, to react to. The state, and the state initiatives, was the substitution for the market.¹²

Before getting into the case of the early Swedish computer industry in more detail, some fundamental dissimilarities in the prerequisites for the development in Sweden and the US must be noted. The most obvious one is the size of the home market, which in this case often was synonymous with the national governments. Sweden was, and is, a small (or even ‘peripheral’), relatively open economy, highly internationalized and dependent on the performance of the export oriented industry. The producers of computers, for both military and commercial purposes, were in the initial stages, i.e. up to the mid 1950s, solely focused on their home markets. This was true for producers both in the US and in Western European countries. For example, the purchase orders for computer power set up by the US government were open only for domestic enterprises. The Swedish government, however, never adopted such a policy. Why this was the case will be further elaborated later in this study.

There are some European post-war cases of large-scale transnational projects, including both governments and private enterprises. Some of these were carried out rather successfully, with the development of the Concorde aircraft as perhaps the best-known example.¹³ But such intentions of transnational cooperation were never even an option in the development of the Swedish computer industry. Furthermore, at least to my knowledge, there were no serious attempts at all to create a European computer project that really could challenge the hegemony of the American computer industry. In fact, the two Swedish enterprises studied here – Facit and Saab – had serious difficulties even establishing a fruitful cooperation between themselves.

The initial phase

In the first years after the end of the war, the Swedish government, several governmental bodies and mathematical/scientific departments at the universities had great hopes of buying, if not complete computer machines (or ‘mathematical machines’ as they were most frequently termed), at least the core components from the US. For example, the Swedish Naval Forces and the Defense Research Agency both stressed the need for machines intended for military purposes,

especially for ballistic calculations and for handling missile guidance problems.¹⁴ Also the Royal Academy of Engineering Sciences¹⁵ was one of the most important actors in this initial stage and made use of its established contacts with the American government and research institutes and universities.

The CEO of the Academy, *Edy Velander*, had already in the late 1910s spent a couple of years at MIT and then advanced swiftly within different Swedish governmental bodies, for example the National Water Power Board¹⁶, after his return to Sweden. In 1943 Velander was appointed technical attaché at Sweden's legation in Washington. Eventually Velander turned out to be one of the most important individuals in the establishment of a domestic computer industry, especially in his role as an intermediary, both for the transfer of information between the US and Sweden and in balancing public and private interests in Sweden. The Academy, and especially Velander himself, was from the very beginning convinced about the necessity of also having a number of private enterprises informed and involved, not least since governmental funds always tended to be too scarce. Velander and his successors in Washington, Hugo Blomberg and Axel Ekwall, frequently reported back home about the developments concerning computers and the new technology of electronics.¹⁷

Vannevar Bush, professor at MIT and one of the pioneering scientists of the early American computer development, who had during the war been responsible for the coordination of the advanced research in the US and after the end of the war had been appointed President of the federal organization Joint Research and Development Board, was one of Velander's, and Sweden's, most important contacts in the US at this early stage. When the Swedish Naval Forces, the Defense Research Agency and the Academy of Engineering Sciences in the spring of 1946 jointly decided to send Stig Ekelöf, professor of theoretical electricity at Chalmers University of Technology, on a 3-month long mission to obtain information about the latest developments concerning the mathematical machines in the US, Edy Velander contacted Bush, who in turn promised to help Ekelöf get the right connections and to be his designated contact man. In 1947 Ekelöf was followed by five promising and carefully selected engineering students who were sent to the US for approximately 6 months, with a similar mission.¹⁸

Gradually Velander himself and the Academy took on a greater responsibility to administer and organize the attempts to procure US-built machines for Sweden,

not least in order to defuse the military character of the project. In the spring of 1947, the Swedish government formed a temporary committee to handle the question, a committee that in November 1948 was transformed to the National Committee on Mathematical Machines.¹⁹ The Committee was instructed to “plan and lead the work on mathematical machines for Swedish purposes and thereby investigate the possibilities of purchasing them from abroad or constructing them within the country.”²⁰ Edy Velander was of course a member of both these governmentally initiated, sanctioned and financed committees.

However, the initial objectives of procuring completed mathematical machines from the US eventually, in 1948, had to be abandoned. The attempts to work upon the American contacts and the personal relationships with the US government and research institutes, and convincing them to sell machines to Sweden, were in this sense fruitless. The emerging Cold War had put an effective end to such a straightforward technological transfer, and the American government apparently did not completely trust the Swedes in keeping the new technology to themselves.²¹

Consequently, and in accordance with the instructions for the Committee, the plans for building machines within the country were intensified. And since it was still possible to transfer knowledge, drawings and even blueprints of some of the machines and some of the core components from the US to Sweden, these plans were not before long transformed into completed machines. In 1949 and the early 1950s several machines were built, both at the Royal Institute of Technology and at the Defense Research Agency. In November 1953 the Swedish efforts reached their climax up to this point. A machine called the BESK (Binary Electronic Sequence Calculator) was presented to the public. For a short time the BESK-machine was considered to be one of the fastest computers in the world and came to serve as the blueprint for several upcoming Scandinavian computers.²² One of the most important designers of the BESK-machine was one of the Swedish students who had been sent to the US in 1947, *Erik Stemme*. He had divided his stay in the US between the laboratories at RCA (Radio Corporation of America), which was one of the largest producers of electronical equipment in the US, and the Institute of Advanced Study at Princeton University and had thus experience from two of the leading research organizations in the world. After his return to

Sweden, Stemme had been assigned firstly to the Defense Research Agency and then, from 1950, to the National Committee on Mathematical Machines.²³

So far, the Swedish computer project was mostly delimited to public interests in the form of the government, governmental bodies and universities. A small number of private enterprises, amongst them Saab, had since late 1946 been invited to take a more active part and at least to get inside information on what was going on. In their development of military aircrafts, Saab had many complex calculating problems and became a frequent customer in using the machines built by the government. Saab also bought blueprints of the BESK-machine and built a copy of it, that was completed in 1957.²⁴ But in the mid 1950s Edy Velander and the Academy had still not, despite the outspoken intentions of merging public and private interests into this project, been able to convince the private enterprises to really get invested in the establishment of a Swedish computer industry.

A hostile (?) takeover: Facit's recruitment of "the Besk Boys"

In early 1956 things changed rather spectacularly, however, as Facit decided to take action. Facit started by hiring Erik Stemme, who they identified as the most prominent engineer in the group of young engineers that had developed the BESK machine. Stemme was then given the opportunity to select the individuals he wanted to have as his future collaborators. A total of 18 engineers were hired, and this group was then nicknamed by Facit as "the BESK Boys". Facit was also anxious to inform the Swedish government and to get its approval, before recruiting the engineers, especially since it was one of Facit's largest buyers of office machines. Hence, the Minister for Finance, Gunnar Sträng, was informed about Facit's intentions and gave his blessing to the arrangement.²⁵

Why did Stemme and his colleagues leave their positions at the Committee on Mathematical Machines? One reason is that the salaries offered by Facit, which at this time was a highly profitable company, were considerably higher than what the government could pay them. But a more important reason was probably the widespread discontent among the Committee's personnel. Facit was informed by different sources, among them Edy Velander, that Stemme and several of his colleagues were most dissatisfied with the Swedish government's decision not to invest in further computer development – at least on for them acceptable levels –

after the completion of the BESK machine. The slow-moving governmental bureaucracy surrounding every decision, both technical and financial, seriously hampered the committee's ability to further develop new machines and its ambitions to keep pace with international competitors.²⁶

But why then did Facit get involved in the business of producing large-scale computers, and what were the reasons for hiring the BESK boys? Initially the task for the BESK Boys was to continue to produce more copies of the BESK machine, within Facit's newly established electronics department in Stockholm. It was no secret that a number of domestic customers – both private enterprises and different governmental organizations, such as the military forces – stood in line to use the calculation capacity offered by the BESK machine. Facit's assessment was thus based on an obvious and rapidly growing demand for more computer capacity on the Swedish market. Building more copies could very well turn out to be a profitable business.²⁷ But one must also consider Facit's historical background and its traditions of doing business on international markets, and especially its connections with the US market and producers.

In the mid 1950s Facit was the world's 11th largest producer of mechanical and electro mechanical office machines. In some sectors its position was even stronger. Facit was, for example, second in producing calculating machines and seventh in adding machines. In Europe, only the Italian company Olivetti and the German company Olympia could compete with Facit as to size. Compared to its American counterparts, however, Facit and its European competitors were still midgets. The four giants of the international office appliance industry – IBM, Remington Rand, NCR and Burroughs – were all American enterprises, and everyone of them 10 times or more the size of Facit.²⁸

Facit was also a very market- and export-oriented company. The management had identified the marketing and sales organization, and its traditions of selling machines on the rapidly expanding markets in both Europe and in more developing economies, especially in Latin America, as the comparative advantage in relation to the competitors. In the mid 1950s Facit had nearly 1000 of its 6000 employees stationed abroad, mostly within marketing and sales.²⁹ In some sense similar to the way IBM reorganized and redefined its internal capabilities and long-term strategies after World War II, Facit aimed to make use of its market organization and their day-to-day contacts with a broad layer of customers,

especially through mediating and transferring the demands and desires from customers all over the world to the development and production departments in Sweden. The long-term vision was to develop Facit into ‘the IBM of Scandinavia’, but the management was at the same time very much aware of the fact that the company could not compete with the largest US producers. They were simply too big and had resources that Facit never could match, not even if it could have been able to raise massive support from the Swedish government. Still, Facit had the intention to exploit its specific knowledge and capabilities and the fact that most American enterprises within the emerging computer industry at moment were entirely concentrated on their home market.³⁰

Doing business with American enterprises and getting first hand information on the general developments on the US market had been an essential part of Facit’s daily operations since the 1920s. Facit sold several types of office machines made in the US on the Swedish and Scandinavian markets, for example typewriters made by Royal and addition machines made by Dalton. But gradually, from the 1940s, machines produced in Facit’s own factories in Sweden replaced the machines produced in the US. Some business connections with several American enterprises and especially important personal relations were, however, kept active. Being a family company, majority owned by the Ericsson family, representatives of the family were particularly deeply engaged in making these personal networks both wider and deeper. Elof Ericsson, CEO from 1922 to 1952, and his son Gunnar Ericsson (CEO from 1957 to 1970), made quite a few trips to the US with just such a purpose, often accompanied by other managers in Facit.³¹ When Facit now decided to take a rather bold step into the new business of commercial large-scale computers, the management had a rather clear view of the latest technological developments in the US market and also intended to exploit its good personal relations with some of the enterprises and research institutes in America. And, again, Facit’s conclusion was that the US enterprises had their hand full with satisfying the demands of American customers. They were at this stage not interested in getting involved in the small, peripheral Swedish market.

The internal discussions within Facit’s management on how to react to the technological developments in the US, especially the developments within electronics, and, furthermore, on how this would change the competition on the international markets and influence Facit’s own business, began in the late 1940s

and then accelerated in the early 1950s. In 1953 a new project called the “Super-Facit electronic calculating machine” was launched. The “Super-Facit” was to be something quite different from the traditional calculating machines produced by Facit. Based on a combination of regular electromechanical technology and the new technology of electronics, and with the possibilities to link up the machine with a number of peripherals in turn intended for data processing and transcriptions etc, the “Super-Facit” would be at least ten times more expensive to produce and sell than Facit’s traditional machines. The project included extensive cooperation with the Royal Institute of Technology and a professor Sten Luthander.³²

However, before this project was successfully completed, the opportunity to recruit BESK Boys arose. Since recruiting the BESK Boys would give Facit a fast lane into the latest developments within the new technology, and since the development of the “Super-Facit” had not yet, in late 1955 and early 1956, produced any substantial results, the decision was rather simple. The investments in the new technology were to be increased considerably and, in addition, redirected to the newly established electronics department in Stockholm. Approximately at the same time as the BESK Boys were recruited, Facit also hired the services of Edy Velander. Facit had previously made use of Velander’s connections and know-how for several years but now the relationship was formalized, as he was appointed a member of the board in Facit.³³ With both Edy Velander and Erik Stemme on their payroll, Facit had now engaged two of the most important individuals within the early Swedish computer industry. Velander brought his international and domestic networks within the industrial and public spheres into Facit’s organization, whilst Stemme, having a mounting reputation of being a brilliant scientist and furthermore being very eager to make a career within industry and science, first and foremost gave Facit status and the goodwill of being a forward-looking company with high ambitions regarding new technology and ready to exploit the commercial possibilities.

The other private enterprise in the development of the early Swedish computer industry, Saab, had by 1957 built a copy of BESK, called SARA (Saabs Räkneautomat). Saab was, however, a totally different company than Facit, much more governed by the technological demands associated with the products it was developing. The company constructed not only military aircrafts, but also

equipment such as gun sights, automatic pilots, navigation equipment for aircrafts and robots and more. And in contrast to Facit, Saab had at this stage no ambitions of developing and producing computers for the open market and, furthermore, lacked an equivalent to Facit's sales and marketing organization. In practice, Saab's only customer was the Swedish government.³⁴

Increasing competition from American producers

In the mid 1950s private interests, Facit and Saab, thus took over the initiative from the government and other public interests in the establishment of the Swedish computer industry. The government was in some sense still important, especially as a buyer of computers, peripherals and computer power, especially from Saab's point of view, but its role as initiator and prime promoter had undoubtedly been taken over by the private enterprises. Velanders two-month trip to the US in the spring of 1957, which included visits to IBM, Remington Rand and also some of the largest large-computer customers, notably the US Bureau of the Census, confirmed his and Facit's previous assessments of the American market and technological developments. The US manufacturers in the near future would be occupied with satisfying their domestic customers, giving Facit some opportunity to establish itself as a computer producer, at least for the markets in Sweden and perhaps also Western Europe.³⁵

In the first years Facit's computer project was rather successful. In all 11 copies of the BESK machine were produced and sold, primarily to customers in Sweden, including private enterprises, universities and governmental bodies. Simultaneously with their work on producing BESK copies, Erik Stemme and his associates at Facit's research and development department, had also developed some peripheral equipment for computers, such as the external carousel memory and paper tape reader and punch. And it was the peripherals that awakened IBM's interest in Facit. On 11 November 1958, Facit's CEO Gunnar Ericsson and export manager C-A Skande had an appointment with some representatives from IBM at the headquarters in New York. John E. Brent, vice president and general manager, and J.W. Birkenstock, vice president, declared an interest in extensive cooperation with Facit, above all based on a commercial exploitation of the peripherals developed by Stemme and the BESK Boys. IBM also suggested a technical

interchange between the respective research and development departments. Naturally, Ericsson and Skande returned to Sweden rather exhilarated and even more convinced that the computer project would prove to be a commercial success.³⁶

However, only a few months later, in early 1959, Facit's, and also Saab's, optimism turned into pessimism as the competition on the important home market became considerably fiercer. IBM, Remington Rand, RCA and other American companies decided to enter the Swedish market for computers and computer power. The reasons for the American enterprises' incursion on the Swedish and other Western European markets were several. The US export prohibitions regarding the shipment of computers and other possible militarily strategic products to Western Europe had been somewhat relaxed, despite the fact that the Cold War was intensifying. Hence, a large number of US enterprises within the office appliance industry exploited this opportunity to expand their markets, setting up subsidiaries and sales and marketing organizations all over Western Europe. An additional reason was the fact that the Swedish government had announced a couple years earlier that it intended to place a multimillion-dollar purchase order for computer power, to, for example, take care of the national census. And contrary to the US government's policy of directing funding solely towards domestic (American) organizations, the Swedish government's purchase order was open also for international competition.³⁷

Facit also witnessed a dramatic change in the previously open business climate from the late 1950s. Erik Stemme and other representatives of Facit were no longer welcome to visit the leading laboratories and research institutes in the US. Facit complained of course to IBM, referring to the shutting out of Stemme and his colleagues, but also to IBM's refusal to deliver newly developed computer accessories according to the previous agreement. A Mr. Gosselin, representative of IBM, replied in July 1959 that in its opinion, the cooperation between IBM and Facit had come to an end. IBM was no longer interested either in buying computer peripherals or in any form of cooperation.³⁸ From a strictly commercial perspective, i.e. the perspective that Facit had adopted, the market for large-scale computers was closed due to the increasing competitions from the American producers. Instead, Facit turned its attention to the development and

commercialization of other computer peripherals and to establishing some kind of cooperation with the other Swedish computer producer, i.e. Saab.

The cooperation attempts and the developments in the 1960s

In October 1959, Saab and Facit announced an agreement that, in the best case, would make it possible to establish an internationally competitive Swedish computer industry. However, the cooperation failed soon after. One reason was that relations between the two had been rather chilly since Facit's recruitment of the "BESK Boys" in 1956. Saab met Facit's move with a tender offer to Stemme and his colleagues, who however stood loyal to their contracts with Facit. Saab, and its CEO Tryggve Holm, had clearly not forgotten the humiliation of being outdone by Facit. Gunnar Ericsson, CEO of Facit, had several meetings with the management of Saab in late 1959 and early 1960, but his reports from these meetings reveals a marked lack of interest from Saab. According to Ericsson, Tryggve Holm was more focused on the opening of a new car factory. Rather depressed by Saab's negative attitude, in the autumn of 1960 Facit decided to abandon its efforts at this large-scale cooperation.³⁹

Saab apparently had the upper hand in the negotiations with Facit and did not feel any urgent pressure to get invested in cooperation. Saab was, furthermore, also considerably more successful than Facit in exploiting the possibilities of governmental support and financing in the development of their computers, accessories and computer systems. The fact that Saab could develop civilian versions of their military machines, which in turn had been financed by governmental funds, directly or through purchasing orders, was one important explanatory factor to the company's achievements in the 1960s. In 1961 Saab announced its new D21 medium-sized mainframe system, which turned out to be a good contestant to the American machines, especially IBM's, in the race for governmental orders in Sweden.⁴⁰

The success for Saab and its computer department, Datasaab, continued in the 1960s and made it Sweden's first big computer producer. In 1965, after a long test period of rivaling domestic and foreign (American) computer systems, the Swedish Parliament decided to order 12 copies of the IBM 360/30 and 8 copies of the developed D21 – the D21-P system. When the state administration a couple

years later carried out an assessment of the first 20 systems, the conclusion was that the Datasaab D21 computer was better; in particular it was more reliable. All IBM computers were thus, by 31 August 1970, to be replaced by the domestically developed and produced D21s. As Magnus Johansson puts it: “Big Blue” (as IBM was known) was beaten.⁴¹

Despite the rather strained relationship between Facit and Saab in the 1950s, and the failed attempt to initiate a full-scale cooperation agreement, they *did* cooperate in a number of computer projects in the 1960s. For instance, Facit was involved in the development of the D21-P, as a subcontractor to Saab. In several other projects in the 1960s, developing products with military purposes as well as products for the commercial and open markets, the contractual relationship between the two enterprises was the same. Saab was the principal supplier, whilst Facit was the subcontractor.⁴² Facit and its managers did not, however, consider this arrangement, and their subordinate role with respect to Saab, as problematic. The strategy to develop large-scale computers on its own had been abandoned already in the late 1950s. To some extent the development and production of computer accessories and/or peripherals was considered an important part of the long-term growth strategy. However, Facit’s principal policy in the 1960s was to continue to improve the more traditional electromechanical office machines in combination with increasing of market shares, especially in the developing countries/markets, and then gradually, primarily by joint ventures with American and then Japanese enterprises, to introduce the new technology of electronics into its products. Furthermore, emphasizing Facit’s decision to lower its ambitions of being a computer manufacturer, Erik Stemme and a majority of the “BESK Boys” one by one left the company in the 1960s and continued, in many cases rather successfully, their careers within universities, governmental bodies and other private enterprises. With Edy Velander’s untimely death in 1961, Facit also lost one of its most important contact nodes into both domestic and international networks within economy and politics.⁴³

When evaluating the rather different outcomes of the efforts made by the two private enterprises – Facit and Saab – to establish themselves as producers of computers and computer systems, and to be a part of the early Swedish computer industry, one must consider some profound dissimilarities in their initial

ambitions and business strategies, their organizational and technical capabilities and, not least, their dependence on governmental support in one way or another.

Facit was basically a very market-oriented enterprise, depending on and trusting in its ability to perceive, interpret and redirect the market signals – i.e. the changes in the demand – from their customers and then to adapt its product portfolio to these changes. Facit’s worldwide market and sales organization was its comparative advantage. The managers realized very early that they lacked the necessary financial, technological and organizational resources to compete with the leading American enterprises. Recruiting the “BESK Boys” was a short cut to acquire technological competence, and getting into the business of producing large-scale computers was a high-risk project, which, in the best case, could have generated huge profits. But when the circumstances and preconditions on this market changed in the late 1950s, Facit was quick to change its computer strategy.

Saab, on the other hand, developed into Sweden’s first large computer producer. It had the advantage of being not as dependent on the market signals and on generating income on the open markets in the same way as Facit was. Saab’s main, and often only, customer was the Swedish government. The research and development department did not have the same pressure to develop products ready for sale, and the managers obviously had the opportunity to give priority to increasing the company’s long-term technological capability. Saab was thus, in several respects, clearly a more technology-oriented company. An important difference between Facit and Saab, explaining their diverse strategies, was also the ownership structure. From its establishment in the late 1930s, Saab had been owned by and was a part of the Wallenberg-sphere, without comparison Sweden’s most influential group of industrial owners from the early twentieth century and on. The Wallenberg-sphere had both the financial resources and the industrial competence to launch long-term industrial projects. But at least as important in the case of Saab’s computer venture was the sphere’s access to, and influence on, Swedish governmental policies and economic-political decisions. One of the hallmarks of the Wallenberg-sphere, and a key explanation for its continued ability to uphold its influence on Swedish industry up to today actually, has been its close connections to the political decision-makers.⁴⁴ Facit’s owners operated under quite different circumstances and maybe did not have the financial durability that Wallenberg-sphere could offer. The Ericsson family was the

majority owner of Facit, but since the company had also been listed on the Stockholm stock exchange and had thousands of small shareholders. There was thus a pressure on the managers of Facit to satisfy sometimes more short-term demands on dividends and to increasing market evaluations of the Facit-shares.⁴⁵

The development of Facit's and Saab's computer ventures in the 1970s and 1980s is also symptomatic for how the Wallenberg-sphere carried out industrial reconstructions and restructurings. In 1972 Facit was sold to Electrolux, also controlled by the Wallenberg-sphere. Two years later Electrolux sold the Facit's computer department to Saab, which merged it with its computer department, Datasaab. In 1981, Datasaab was then sold to Ericsson – yet another company in the Wallenberg-sphere – and its computer department, Ericsson Information Systems.⁴⁶

Conclusions

The development of the Swedish computer industry from World War II to 1970 can be divided into three stages, with somewhat different characteristics concerning the role of public and private interests respectively and the mutually beneficial relationship between the two. In the initial stage, from the end of World War II to the early 1950s, governmental initiatives to establish cooperation both within the Swedish context, as well as with the US government and the leading American research organizations within the emerging computer technology, was crucial. The governmental initiatives – for example the formation of the National Committee on Mathematical Machines in 1948 – and the ambitions to satisfy security policy issues, which in turn included the military forces' acute demand for computer power, doubtlessly led to a direct and indirect transfer of knowledge and technology from America to Sweden and laid the foundation for the private enterprises' computer projects at the later stages.

In the second stage, approximately from the early 1950s to the late 1950s, the mutual relationship between public interests and private enterprises changed. The government did not want to continue to be directly involved into the transferring process and to invest in a governmentally owned computer industry. Instead, private enterprises took the initiative. Saab was deeply involved in the development of military aircrafts and military equipment, with the Swedish

government as its primary buyer. The private enterprises, and especially Facit, identified a business opportunity in the 1950s as the American producers concentrated on meeting the demand on their home market. Facit launched a rather ambitious computer project in the mid 1950s, based on the technological capabilities that had been acquired when a group of previously governmentally employed engineers were recruited. However, the American producers' decision to move into the Swedish and European markets for large-scale commercial computers put an end to this venture.

In the third stage, from the late 1950s and through the 1960s, Saab was undoubtedly the prime driving force in the development of the Swedish computer industry, whilst Facit primarily took on the role of being a subcontractor to Saab, delivering computer peripherals and equipment. The Swedish government continued to play an important role as purchaser of the military products made by Saab, and to some lesser extent Facit, and by putting out purchase orders for computer power on the open market. A spin-off of Saab's military projects was its development of commercial computers, which from the late 1960s competed successfully with American-made computer systems.

There are some principally interesting differences between Saab and Facit that can contribute to the understanding of why Saab's computer project turned out to be a commercial and technological success story, and why Facit's did not. Saab played an important part in the military-industrial complex in postwar Sweden and received substantial governmental support, both financial and technological. Facit on the other hand, received nowhere near the same governmental assistance, and actually did not ask for it. Facit's computer project was not directly related neither to the development of the Swedish welfare society nor to the development of Sweden's warfare capacity. Hence, Facit's computer project was not of immediate interest to the government and consequently didn't receive its support.

Placing the Swedish historical case in an international context, especially with the developments in the US, reveals both similarities and differences. Surely the development of the Swedish computer industry from World War II to 1970 can be characterized as a state-led or state-propelled process as in the US case, at least in the initial stages. But the Swedish government chose a rather different, and more indirect, way to support the establishment and development of a domestic computer industry. Whilst the US government chose to target its direct funding

and purchase orders exclusively to American enterprises and research institutes, the Swedish government applied a more open procedure, especially in the 1960s when large purchase orders for computer power were placed on open market, free for international competition. The general conclusion concerning the development of the early Swedish computer industry persists still, it was exceedingly an interdependent process where public and private interests interacted. However, the initiatives from, and the different capabilities of, the private enterprises were the primary force in this process.

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⁷ Another important source is the witness seminar "Working with the Computing Machines of the 1950s" held at the national Museum of Science and Technology in Stockholm on 12 September 2005. Several of the most important individuals within Swedish computer history attended this seminar and gave their personal views of, amongst other things, the development of the first Swedish electronic computer BESK, the design of subsequent BESK copy Facit EDB at Facit AB and their experiences of working within government and private organizations, see Per Lundin ed., "Att arbeta med 1950-talets matematikmaskiner" [Working with the Computing Machines of the 1950s], *Transcript of a witness-seminar held at the Swedish* (Stockholm, 2006).

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¹⁸ De Geer, *På väg till*, 20–23. Furthermore, Ekelöf had in 1938 spent a year at MIT and Harvard University and was probably also already acquainted with Vannevar Bush, see Johansson, *Early Analog Computers*, 27.

¹⁹ In Swedish: *Matematikmaskinnämnden, MMN*.

²⁰ Johansson, *Early Analog Computers*, 29.

²¹ De Geer, *På väg till*, 20–23; Johansson, *Early Analog Computers*, 27–29; Lundin, *Att arbeta med*, 30.

²² For example, the first Danish computer, DASK, presented in 1957, was a customized version of the BESK machine and one result of the bilateral cooperation, see Peter Klüver, "From Research Institute to Computer Company: Regnecentralen 1946–1964", *IEEE Annals of the History of Computing*, vol. 21, no. 2, (1999), 31–43.

²³ Johansson, *Early Analog Computers*, 28; Lundin, *Att arbeta med*, 9–10.

²⁴ Johansson, *Early Analog Computers*, 30.

²⁵ Letter from Rolf Dencker, CEO of Facit to Gunnar Ericsson, vice CEO of Facit, 15 February 1956 and 20 February 1956; Minutes of the Board, 12 December 1955 and 8 March 1956, Facit archive, Åtvidaberg.

²⁶ Letter from Edy Velandar to Elof Ericsson, 14 February 1956, Facit archive, Åtvidaberg. See also Lundin, *Att arbeta med*, 32–35.

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²⁸ Cortada, *Before the computer*, 250–255; Internal Memo, Facit archive, Åtvidaberg.

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