

# National Projects and International Users: Finland and Early European Computerization

Petri Paju

*University of Turku, Finland*

By the time the first operational electronic digital computer was installed in Helsinki in 1958, Finland's computerization was already far advanced. The Finnish experience helps illustrate the spread of computing technology in Northern Europe. In Finland's case, it occurred through a combination of national goals and internationally acquired technology and expertise.

The spread of computing technology everywhere was a profoundly international phenomenon, but it was at the same time permeated by national interests and motives. As a small country on the losing side of World War II, Finland played virtually no part in computing's early development. In postwar years, however, Finnish interest in computing began to grow, and by the 1960s the use of computers had become relatively widespread. The Finnish experience helps show how the early transfer of computing technology occurred in Northern Europe, and how—in Finland at least, although Finland had no computers for most of the decade—substantial computerization had proceeded in the 1950s, resulting both from international interaction in computing and from national actions to secure the country's technological independence.

Two events are regarded as turning points in Finland's computerization: the first event occurred in late 1958, when the state-owned Post-Savings Bank inaugurated Finland's first computer, an IBM 650. The second event was the building of the ESKO computer, an effort that began in 1955 and ended in 1960. Finland is thus usually described as a relative latecomer to computing, compared for example to Sweden, an early entrant in computer technology. As William Aspray has suggested,<sup>1</sup> an examination of interactions between these countries might cast new light on the claimed difficulties a small country such as Finland had in achieving computerization.

In this article, I examine the work of Finland's Committee for Mathematical Ma-

chines (*Matematiikkakonekomitea*), the committee responsible not only for constructing the ESKO computer but also, to a large degree, for shaping the nascent field of computing in Finland. This shaping of course took place through interaction with foreign experts, Konrad Zuse's company, and especially with IBM.

The early history of computing in Finland cannot be properly understood as either a national history or a history of international relations and technology transfer, but only as a combination of the two. Early Finnish computing has been considered highly international, yet researchers have not examined these international relations in detail. Instead, Finnish computer history has largely been viewed from a national perspective, with a focus on machines and producers. Interestingly, early Finnish computer professionals thought of themselves as a patriotic brotherhood and as nation builders.<sup>2</sup> This twofold view of Finland's history of computing in the 1950s is a central subject in this article. In this article, the user's perspective is paramount. By user, I mean all potential users or operators of a computer: in early computing, these would mainly have been scientists and scientific organizations, or engineers and mathematicians. The user is thus partly the same as a client (such as a scientist) who might also be a representative of an administrative body. In this article, I explore where users looked for information about the new machines and what their motivations were.

I extend the discussion of computing's international history, focusing on develop-

ment at the national level,<sup>3</sup> examining the options available in early computerization (research, supply, and use of computers) in northern Europe. Finland was perceived as having been situated between the two Cold War blocs: thus we might find possible effects of this circumstance on computer technology transfer. Moreover, these effects may contribute to our understanding of the role of computers in reimagining the nation in the Finnish case<sup>4</sup>—and which also prepared the way for the present Nokia Corporation.

I introduce the Finnish tradition of technology transfer, followed by a discussion of the possibilities open to early computer users in Finland. These developments all played a part in the Committee for Mathematical Machines' project. Next, I analyze the process whereby this committee simultaneously adopted important influences from abroad and transformed its project into a national endeavor. Finally, I examine how the Committee first competed, and then collaborated, with IBM Finland, which emerged as a market leader in the country's rapid computerization in the 1960s.

### National model: Technology transfer

Although often presented as a starting point, the study of electronic computing in Finland did not actually begin with the Committee for Mathematical Machines in 1954. The Committee's work was preceded by earlier Finnish research on analog computers and also by several attempts to argue for the national benefit to be had by investments in developing technology. During World War II, Finnish scientists involved in the war effort at the National Airplane Factory, for example, tried to overcome Finland's technological dependence on Germany. The country's negative experience of that dependence formed the basis for discussing the need to increase Finland's technological independence during the postwar and the Cold War periods.

A key figure in early Finnish computing, and later in Finnish science policy, Erkki Laurila, had served at the National Airplane Factory. When he became professor of engineering physics at the Helsinki University of Technology in 1946, he continued his prewar studies of analog machines.<sup>5</sup>

Laurila was notable for combining his technological projects with national concerns. In the years after World War II, many Finnish scientists felt threatened by Soviet influence. Historically, during wartime most scientists and academics—like the official state—had

been politically on the right since gaining independence from Russia in 1917 and fighting a brutal civil war against the left in 1918. After World War II, the communists tried to gain politically from the new situation—including influencing the fields of science and technology. In officially apolitical ways, Laurila played a part in resisting the newly strengthened Communist Party's suggestions and reforms in the late 1940s. This "patriotic" motivation was probably one incentive in Laurila's technological and cultural work in a number of organizations and groups.<sup>6</sup>

In the Finnish Cultural Foundation (*Suomen Kulttuurirahasto*), Laurila was appointed to its executive committee in 1949. The foundation promoted Finnish culture in a broad sense, from the arts and humanities to the economy and technology. This broad concept of culture was derived from the Finnish "national philosopher" Johan Vilhelm Snellman, a Hegelian and a *Fennoman* (promoter of Finnish national interests and advocate of the Finnish language rather than Swedish), who had urged the Finns to develop their country both spiritually and materially. For foundation members, cultural policy was a tool to strengthen the Finnish national identity,<sup>7</sup> which included Finnish achievements in technology.

Moreover, Snellman—imagining Finland anew in the 19th century—had taught that international exchange was not contrary to national development or uniqueness; rather, a nation was not fully grown or independent until it could offer something of its own to the universal development of culture. This way of thinking is perhaps why Finnish technology transfer has been characterized—based on a study of the electrification of the country—as a special "Finnish model." This model of technology transfer included choosing roundabout and even slow methods of transfer because the Finnish recipients wanted to maintain control over the transfer process. According to historian of technology Timo Myllyntaus,

The ideology of Finnish nationalism did not oppose but supported industrialization and the adoption of new technology. ... A strong industry and a self-managed economy were seen as a foundation of the national identity and a guarantee of national existence. Electrification was an integral part of Finnish economic nationalism.<sup>8</sup>

In the postwar decades, Laurila worked at the Finnish Cultural Foundation to devise a cultural policy promoting technology and

the new applied research. His audience there likely included for instance Urho Kekkonen, then prime minister and later president, and many other influential persons interested in these questions that would become central to Finland's future science and technology policy. At the same time Laurila, along with his students, continued to follow international developments in computing machines. Together with his mentor Evert J. Nyström he had conducted research on analog machines in the 1930s. They had good contacts with researchers in Germany, for example Alwin Walther.<sup>9</sup>

### Prospective users go international

Several Finnish engineers and scientists left the country after Finland surrendered to the Soviet Union in 1944. They moved to Sweden, the US, or Switzerland, where for example Rolf Nevanlinna, an internationally prominent mathematician, joined the University of Zürich as a professor in 1946. There, he learned about computers through the Swiss Federal Institute of Technology (ETH) computing center. This center, run by Eduard Stiefel, had begun using Konrad Zuse's Z4 machine in 1950.<sup>10</sup> But Nevanlinna also had other opportunities to learn about computers, notably through his Swedish relative Gösta Neovius, who was one of six Swedes sent abroad by Sweden to study computers in the late 1940s. Neovius was involved in designing the first Swedish computer (named BARK) and which used Nevanlinna's wartime research on ballistic methods.<sup>11</sup> Later, in 1954, Nevanlinna would become chairman of the Finnish Committee for Mathematical Machines.

The Swedish BARK, an electromechanical relay computer completed in 1950, was the first digital computer in postwar Scandinavia—and one of the first computers in all of Europe. In the early 1950s, Laurila and his students were the only Finnish team researching the new machines. With the help of modest funding, Laurila was able to follow developments in mathematical machines from journals and, of no small importance, while on trips to Sweden. Together with his engineering students, Laurila built portions of an analog computer in Helsinki in the early 1950s. This research was justified by arguments invoking nationalism, namely to train Finnish experts in the new and promising field of computing.<sup>12</sup> In fact, Finns had already become familiar with the BARK before these latest Finnish efforts.

Such familiarity resulted not only because Finns travelled abroad to see computers, but also because foreign experts occasionally visited Helsinki—and earlier than typically has been recognized. Although these visitors have not been systematically traced, they included at least Sweden's Stig Egelöf in 1950 and West Germany's Alwin Walther in 1951; both had been invited by the Helsinki University of Technology, where Laurila worked. Ekelöf's visit, for certain, was publicized in *Helsingin Sanomat*, a leading daily newspaper.<sup>13</sup> On his trip, Ekelöf discussed the BARK. I suggest that, through these sorts of presentations and through his published articles, Laurila was laying the groundwork for a future Finnish "mathematical machine"—as electronic computers were then known.

Judging from the publicity, we might say that, like television, computers were introduced in Finland theoretically and mentally, and in this sense the country was "computerized," years before the actual devices were imported. In the case of television, in the latter half of the 1950s Finland debated the new technology based on experiences, information, and discussion from abroad prior to test broadcasting in 1955 and television's official inauguration, first in 1956 and then by the state in 1958.<sup>14</sup> In addition to electronic computers, this early period of mediated computer culture introduced Finns to robots, which first appeared in the press in the 1920s and in postwar news reports and stories about "electric brains."<sup>15</sup>

However, prospective Finnish users of computing technology, although few in number, did not passively await a computer. In 1950, the year BARK was inaugurated, Gustav Järnefelt, astronomy professor at the University of Helsinki, made inquiries in Sweden concerning the new machine and had his calculations for astronomical models computed on the BARK in 1951.<sup>16</sup> Others, such as mathematicians and the prominent meteorologist Erik Palmén, no doubt could describe computers they had heard of or seen while visiting or working in the US. In addition, certain Finnish mathematicians working in Sweden were introduced to the new field.<sup>17</sup> Thus at least a few Finnish scientists actively used their international relationships to gain access to a computer. The first computer to which Finnish scientists had practical access was the BARK, one of the earliest computers in Europe that Finns could use almost a decade before the country acquired a working computer of its own.

It is noteworthy that Finnish scientists had practically no contacts with computer experts in the Soviet Union, even though one of its leaders promoting cybernetics was Soviet scientist Aksel (Axel) Berg, originally a Finn.<sup>18</sup> Most of the Finns interested in computers had recently been involved in fighting a war against the Soviet Union in World War II. Not surprisingly, they seem to have shared a conscious policy of avoiding contact with the Soviets. Unlike the situation in atomic energy research, the Soviets themselves did not suggest cooperation in computer technology. In contrast, Finns studying and teaching in the US were in contact with other Finns both there and in Finland. These contacts were kept alive (or not) through personal interaction and friendships, as seems to have been the case of Vidar M. Wolontis, who worked for Bell Telephone Laboratories and participated in making an IBM 650 interpreter.<sup>19</sup> Later, Finnish experts would refer to Wolontis's achievements—but not Berg's—publicly and presumably with national pride.

Well aware of the increased interest in computers among prospective users, in 1954 Erkki Laurila submitted a proposal to the relatively new State Board for the Natural Sciences, to establish a committee to investigate the possibilities of making a “mathematical machine” available in Finland. By this time, Laurila had the support of some national authorities in mathematics, one of them being professor Pekka Myrberg, head of the board in question, who himself could expect a computer to advance his research. After only a few weeks, the board established the Committee for Mathematical Machines, and the Committee began its work.<sup>20</sup>

### Committee opts for Germany

Starting in spring 1954, the task of the Committee for Mathematical Machines was to determine whether and how to acquire a computer for Finland. The Committee's work was regarded as one of the first large-scale scientific projects in postwar Finland. This pioneering position was probably why the Committee needed to be justified with solid arguments. The Committee's decisions would come to express the more general standpoint in Finland, including conflicts, toward the postwar expansion of scientific and technical research and its consequences.

The academician Rolf Nevanlinna was appointed Committee chairman to ensure funding. He too had previously expressed an interest in the use of computers, at least

Swedish ones.<sup>21</sup> As Laurila, who became Committee vice-chairman, had done earlier in the Cultural Foundation and elsewhere, he now, in the Committee for Mathematical Machines, emphasized the need to build Finnish know-how in mathematical machines. He argued that even the Finns (who were accustomed to importing technology) could benefit from technical research and inventions if these areas were properly encouraged and funded.

Unlike Laurila's position, Nevanlinna's position was that the most pressing and nationally important reason for Finland to acquire a computer was the need to keep up with developments by promoting mathematics and sciences. Other Committee members, such as Gustav Järnefelt, represented various areas of applied mathematics (astronomy, probability calculus, and strength theory); they also included an artillery general representing the country's Defense Forces, which had from the start been designated as having the most urgent need for a Finnish computer.<sup>22</sup>

To reach a compromise among these competing interests, the Committee quickly decided to obtain a computer, and furthermore to do so by copying one. They chose to duplicate a G1a computer from Göttingen, Western Germany. The G1a was to be completed in Helsinki under a tight schedule (18 months or less), and the construction process would, moreover, result in some Finnish engineers being trained as computer specialists.<sup>23</sup> Fortunately, the Max Planck Institute for Physics in Göttingen had offered Nevanlinna a blueprint of their recently planned small scientific digital computer, the G1a, which the Committee could copy without charge in Finland.<sup>24</sup> A German scientist, Wilhelm Hopmann, planned to build the G1a computer as a follow-up version to the successful G1 computer. Hopmann designed the G1a as an ambitious “minimal machine”; a construction that would need only a minimal number of parts and would be useful to scientists in different fields.<sup>25</sup> For Laurila, opting to copy the G1a was a detour to his plans of developing Finnish know-how but an acceptable one as it was apparently the only way to initiate the learning process almost immediately.

### Engineers: Andersin and Carlsson

In general, the Finns followed recent Swedish practice in transferring technology. In justifying the establishment of the Com-

mittee for Mathematical Machines, Laurila referred to the Swedish board that had examined the machines in 1947. In fall 1954, Laurila sent two engineers who were former students of his, Hans Andersin and Tage Carlsson, to observe and study work at the computing center of the Swedish board for computing machinery (*Matematikmaskinnämnden*) in Stockholm. When the Committee decided to copy the G1a, Andersin and Carlsson were sent to Göttingen for four months to learn about the G computers, specifically the G1a. In so doing, their actions corresponded to what Aspray has called the scientific style of technology transfer in early computing.<sup>26</sup>

Andersin and Carlsson both spoke Swedish as their first language, so studying in Sweden or Germany presented no language problems. In Stockholm they had used the IAS-model BESK computer, and were impressed. They also brought home to Finland an unofficial offer to construct another BESK in Helsinki, but to their disappointment the Committee considered this alternative both too expensive and too extensive for Finnish needs.<sup>27,28</sup> Over the next few years, following Andersin and Carlsson's lead, some Finns would participate in a programming (coding) course held every so often in Stockholm with the BESK.<sup>29</sup>

Andersin and Carlsson wrote a report based on their experience in Stockholm, in which they paid special attention to the organization of the computer center they had visited. They seem to have already been familiar with similar plans for Helsinki.<sup>30</sup> Many of the influences that Finland adopted from abroad would be connected to what, essentially, was this master plan of a national computing center, and the master plan was promoted by the Committee.

While in Göttingen later on, Andersin and Carlsson met with Konrad Zuse and visited his factory in Neukirchen. With the computer design and development group in Göttingen, Zuse had agreed to manufacture G1a computers once the prototype and two copies were completed in Göttingen (the ESKO in Helsinki was counted as a third copy). The G1a can thus be regarded as an early attempt toward the serial production of a small computer in Europe—and as reaching for a commercial style of technology transfer. Andersin and Carlsson were quite interested in Zuse's visions and plans; accordingly, they also secured an agency for Zuse's products in Finland.<sup>31</sup>

### G1a/ESKO computer

Because its program was not stored in memory but on paper tape, the G1a/ESKO



**Figure 1.** In summer 1956, the German designer and builder of the G1a, Wilhelm Hopmann visited Helsinki and also the laboratory where ESKO was built by engineer Hans Andersin, technician Veikko Jormo, and engineer Tage Carlsson. (Left to right: Andersin, Jormo, Hopmann, and Carlsson.) By this time, the G1a had already been delayed and Andersin had decided to move to IBM Finland. (Courtesy of Hans Andersin)

was not a von Neumann type of computer.<sup>32</sup> Despite this characteristic, the ESKO was expected to adequately handle, for instance, ballistic calculations for the Finnish Defense Forces. Other applications for the computer would be in the various areas of applied mathematics represented by members of the Committee for Mathematical Machines; the Committee received most of its funding from the government-sponsored State Board for the Natural Sciences.<sup>33</sup>

In Helsinki, Tage Carlsson was ESKO's main developer. When, because of its complex design combined with premature technology, the G1a computer's construction was delayed from 1956 onward, the German and Finnish builders began greater co-operation (see Figure 1). The direction of influence did not work only one way, from Göttingen to Helsinki: the ESKO team developed an important command for the machine to change the program during operation, a command later incorporated in all G1a computers (approximately 1955 or 1956). In fact, Carlsson and others invented the new instruction thanks to the Ballistics Office of the Finnish Defense Forces, which had criticized the G1a for its relative inflexibility.<sup>34</sup> Because of the construction delay, the army was forced instead to use rented IBM punched-card machines, in the short term, for its calculation needs.

### Computer center, a national plan

At some point after the 1954 decision to copy the G1a had been made, Committee for Mathematical Machines Vice-Chairman Laur-

ila wrote an article in which he invoked nationalism by referring to an “Ilmarinen’s Finland” as something worth striving for.<sup>35</sup> In that article, Laurila was reacting to the country’s suggested budget for engineering education, but he also could have been commenting on the Committee’s decision. The reference to Ilmarinen is to a blacksmith who plays an important role in the Finnish national epic, the *Kalevala*, in which the smith can also be seen to embody technological prowess. Laurila urged increasing technical capabilities and practical skills among Finland’s leaders to make the Finns more independent: not only a nation of writers and wise men (“the Finland of Väinämöinen”), but a nation of technology as well.<sup>35</sup> For Laurila, computers were part and parcel of a larger national strategy.

From the beginning, the Committee intended not only to have a computer built but to create a national computing center in Helsinki, a goal of particular interest to Laurila. This major initiative by the Committee has been virtually forgotten. On the other hand, this centralized usage of expensive computer technology was, at the time, an internationally shared model. The Finns were aware of many such examples although they had not been involved in planning the computing center sponsored in Europe by the United Nations (UNESCO) in the early 1950s and which was eventually established in Italy in 1960. Plans for a national center were similar and simultaneous to the one in Denmark—in Norway, a national computing center had operated since 1952.<sup>36</sup>

As soon as construction work on the Finnish G1a started in Helsinki, the computer was publicized widely in the press. Interestingly, in public an associate of the Committee for Mathematical Machines represented its computer as a Finnish one. The G1a computer was renamed in Finland as ESKO—an acronym derived from *Electronic Serial Computer* (in Finnish spelling), as well as being a popular Finnish male name at the time. The naming of the computer followed the international tradition of computer acronyms; simultaneously, the name ESKO also invoked the well-known Finnish comedy *Nummisuutarit*, by the nationally renowned writer Aleksis Kivi, in which the young Esko was the central character. Although the literary reference was partly a coincidence, this naming and publicity could only have served to signify the national importance of the new device.<sup>37</sup>

The Committee wanted publicity because they had a science policy plan of their own that was linked to the idea of a national

computing center. In this projected computing center, Finnish computer specialists could start serving a wide array of clients, from scientists to industries and also the army, with the center’s new equipment. They could also train and employ more computer experts for the country. As a result of its work for clients, the computing center would derive funds for further scientific R&D work—in computers certainly and probably more generally.

To support its center, the Committee planned to establish a “commercial and nonprofit association.” This association could include state units as well as businesses—such as industrial companies and probably computer suppliers, such as IBM Finland. In principle, all organizations were welcomed.<sup>38</sup> As the first step in implementing the plan, a Committee member—Kari Karhunen, a mathematician and punched card department manager in an insurance company—proposed to the Punched Card Association’s 1955 annual meeting that a joint undertaking be established to create a national computing center. This center could then acquire a large general-purpose electronic computer that would be available for all to use.

As the second step in implementing its plan, the Committee actively promoted its agenda—along with the know-how of the nascent field in general—by giving the first seminars (one focused on technology, one focused on mathematics) on computers in Finland during the academic year 1955–1956.<sup>39</sup> Seminar participants included some of the leading “punched card men,” as the punched-card department managers (mostly from insurance companies, banks, and public organizations) called themselves. Thus the Committee for Mathematical Machines was not only applying the scientific style of technology transfer or development in the computing center, but was also planning to incorporate commercial interests.<sup>40</sup>

Of the two concurrent seminars, the one led by Hans Andersin at the Helsinki University of Technology was divided into two parts. This division reflected the organization of a computing center that Andersin and Tage Carlsson had learned about on their 1954 visit to a Stockholm computing center. In autumn 1955, the seminar audience consisted of punched-card department managers and other potential customers of the anticipated computing center. Andersin’s teaching examined the principles of modern computing, along with the latest international trends. In spring 1956, on the other hand, Andersin went into

details of computer technology and discussed the practicalities of, for example, repairing shutdowns and computer errors, specifically in the ESKO.<sup>41</sup>

In effect, Andersin was training specialists for the customers to eventually hire. This is because in the computing center of a “small country” the computer would be operated by the customer’s own specialists, not specialists employed by the center. We can conclude that the Committee, and particularly Andersin, were preparing for their computing center to start work. Simultaneously, as researcher Mika Pantzar suggested in another context,<sup>42</sup> via publicity and teaching the Committee members were establishing both the need for computers and the need for a new approach to the promotion of science and technology in general.

In their teaching, Andersin and his colleagues received considerable input from a major conference, *Elektronische Rechenmaschinen und Informationsverarbeitung* [Electronic Computers and Data Processing], held in October 1955 in Darmstadt, West Germany. Andersin and Kari Karhunen were among the participants. Keynote speakers included Howard Aiken, Herman Heine Goldstine, and Konrad Zuse; Alwin Walther was the chief organizer. According to the organizers, the conference brought together 530 people from 15 countries; for its time, it was probably the largest and most internationally represented conference on computing ever held. What made it even more exceptional was that the meeting also included presentations by Soviet and East German representatives. Later on, Andersin and others added new topics to their teaching such as “automatic coding” (programming), commercial data processing, and automation in banks and in insurance companies.<sup>43</sup>

### ‘Small-country strategy’

The model for organizing a computer center was presented in autumn 1956 to a larger audience at the University of Helsinki by the Swiss professor Eduard Stiefel. His lecture has not been preserved, but having been known to previously discuss his computing center concept, he undoubtedly discussed the same concept in Helsinki. Stiefel’s computing center concept, based on his ETH experience, involved two strategies for organizing a computing service center: in a *large-country* strategy, a computing center could have many specialized mathematicians working as programmers for specific areas, but a *small-country*

strategy meant that the few mathematicians at a service center could not master all fields. Thus the clients of a center in a small country would have their own programmers, and all engineers and mathematicians would be taught about computers and programming. This “small country” model was already being applied in Stockholm at the time of Hans Andersin and Tage Carlsson’s visit. More to the point, Stiefel emphasized that the small-country model required a simple computer—such as the G1a.<sup>44</sup> Once again, with Stiefel’s efforts the Committee for Mathematical Machines was promoting its ideas for Finland via a foreign expert in the field.

The plans for a computing center, however, did not fare very well. Potential commercial clients of the computing center, such as the punched-card men, were evidently not particularly interested in the Committee’s plans. This can be deduced from the fact that in parallel with the spring seminar in 1956, Andersin and Carlsson developed a plan of their own, and one that was undoubtedly at least partly in conflict with the Committee’s plan. Andersin wrote to his German colleague Hopmann that he and Carlsson were about to start a Scandinavian company to import computers, which later would also offer computer service—for one thing, Andersin and Carlsson were selling Konrad Zuse’s products (including the forthcoming G1a) in Finland. Moreover, their plans included ordering and later perhaps importing an analog computer from Donner Scientific in California.<sup>45</sup> The latter idea, however, was never realized.

The Finland-based company would be called Andersin & Carlsson, Computers and Automation. Interestingly, they knew about the US-based journal *Computers and Automation* edited by Edmund C. Berkeley.<sup>46</sup> The plan also included hiring an IBM salesman they knew to sell the machines. However, after the G1a prototype in Göttingen was first delayed in 1956, Zuse apparently decided not to manufacture G1a computers. By spring of 1956 when Andersin and Carlsson had not obtained any orders, coupled with the G1a production setback, the two quickly abandoned their business plans.<sup>47</sup>

### *International contacts; service options*

An incident from 1956 will serve to illustrate the international contacts and options for computer services available to Finland. In the spring of 1956, professor Pentti Laasonen, a Committee for Mathematical Machines

member, needed computer time. To accommodate him, Andersin first requested time and support on the Swedish BESK computer; he also presented the Swedish team with the option that he and Tage Carlsson do the programming required for Laasonen's calculations. The second alternative was to request permission to use the G2 in Göttingen. In the end, Laasonen postponed his calculations both because of practical issues—such as a shortage of BESK operators—in Stockholm and because he would soon leave for the University of California, Berkeley, to be a visiting professor for the years 1956–1958 and where he anticipated having access to computer time.<sup>48</sup> This episode shows that, by 1956, Finns had access to the Swedish BESK, the German G1 and G2—and undoubtedly some American computers. More would soon be available to them.

In connection with a conference trip to London in the summer of 1956, Andersin visited the computing centers of Bull and IBM in Paris. It was on this visit that he first saw serially manufactured computers in operation—a development he had lectured on earlier in Helsinki.<sup>49</sup>

### **IBM; international opportunities**

IBM had had a subsidiary in Finland since 1936. Finland had imported the first Hollerith machines in 1923, but it was not until the late 1940s that IBM became the market leader in punched-card machines. Beginning in 1955, Finnish IBM offered information on electronic computers by inviting Swedish IBM experts to discuss the new developments.<sup>50</sup> It was very probably the activities of the Committee that prompted the national IBM company—IBM Finland—to enter the computer field.

Then, too, employees of the Finnish IBM subsidiary had also participated in the seminar that Andersin taught. One of the three IBM employees there was apparently the same individual who in 1956 was promoted to chief executive officer of IBM Finland.<sup>51</sup> In fall 1956, Andersin, who was one of the Committee's two most prominent associates, was hired to work for IBM. Judging from the composition of the seminar, the Committee was evidently not excluding IBM Finland from its possible partners. IBM management, however, probably viewed the situation more competitively, which could be one reason they recruited Andersin. It may also be relevant here that IBM Finland, nationally the leading punched-card machine vendor, was mostly run by Swedish-speaking Finns, who in general had, since the end of the 19th century, emphasized shaping

Finland through international exchange.<sup>52</sup> Andersin, too, belonged to this influential Swedish-speaking minority. In contrast, the Committee chairmen were Finnish-speaking and in favor of strengthening Finnish independence, in technology as elsewhere.

Hans Andersin became IBM Finland's first applied science representative. Hiring him was part of a larger IBM campaign for introducing and marketing IBM's electronic computers in Europe. Already, by fall 1956, he was able to offer interested Finns two IBM 650 computers for testing and use: one at IBM's European Scientific Center in Paris,<sup>53</sup> the other, the first IBM computer in Scandinavia, at the insurance company Folksam in Stockholm. The Finnish punched-card men visited the Swedish company in groups to see the machine in operation.<sup>54</sup> Using these or similar computers abroad would eventually qualify several Finns as computer experts back in their home country. At the national level, the exposure to technology that such travel opportunities afforded was regarded as an important benefit by Finnish scientists and punched-card men, especially since the ESKO computer and the national computing center were under construction. With regard to style of technology transfer, IBM World Trade Corporation here used the scientific style;<sup>55</sup> the company was not yet able to adopt a commercial approach in marketing the computer.

As an applied science representative for IBM, Andersin presented courses on computing. These were much like the courses he taught for the Committee, although at IBM he was educating prospective clients and users in, for example, programming for the model 650. At this point, the IBM Finland subsidiary probably could not yet accept orders for electronic computers. Even as he worked for IBM, Andersin continued to serve as secretary of the Committee for Mathematical Machines.<sup>56</sup> For the Finnish scientists on the Committee, this could have been yet another way to apply the strategy of international exchange, only now through IBM and using this input to inform their national plans.

As a result of IBM's new information policy of actively educating customers on computers, which began in 1955, potential customers for computer suppliers, especially the punched-card men, decided to wait for electronic data processing machines to drop in price, and to collaborate with IBM Finland rather than with the Committee's scientists. IBM, in turn, adapted to the national waiting mode while preparing the way for taking over future

computer markets. Had the ESKO been completed when expected in the 1956–1958 time frame, however, the situation might well have changed.<sup>57</sup>

### Race for Finland's first computer

In late 1957, a major punched-card user, the state-owned Post-Savings Bank, ordered an IBM 650 computer. At the time the ESKO was thought to be almost ready as well. What followed was a race between the two parties: who would inaugurate the first computer in Finland? As part of this competition, the ESKO was made public when it was close to being complete in spring 1958. In the popular national weekly magazine *Suomen Kuvalehti*, the second cover (see Figure 2) presented the ESKO as a new Sampo, which, again, referred to the *Kalevala*: in that story, the Sampo is a magical source of wealth created by the famous and technically skilled blacksmith Ilmarinen—and worth fighting for. Tellingly, this information on the magazine cover was accompanied by a photo of an IBM factory manufacturing computers. The magazine article criticized the importing of computers when a domestic computer, the ESKO, was also available.<sup>58</sup> The G1a and the ESKO, however, faced another delay in summer 1958, and IBM won the competition. The first computer operated in Finland was the IBM 650, called the *Ensi* (meaning “first”), and it was installed in the state-owned bank (see Figure 3). IBM had made a special effort and cut the usual delivery time to less than a year.<sup>59</sup>

After this competition, the national Committee quickly accepted defeat. Remarkably, even before the race for the first computer had begun, the Committee had asked the bank's management for permission to use the new IBM computer for public services. The bank gave the Committee access to the computer for the purpose of various scientific and technical calculations, including some for the military command center, as in a computer center. In this case, the two strategies of importing technology and improving domestic capacity and know-how dovetailed for the national benefit. Despite tensions between the two styles of technology transfer, commercial and scientific transfer were combined in this case for mutual benefit.<sup>60</sup>

In 1959, the mathematician Olli Varho of the Committee temporarily succeeded in running a computer center using the IBM computer at a state-owned bank. The Committee had hired Varho because he was experienced with scientific tasks using the

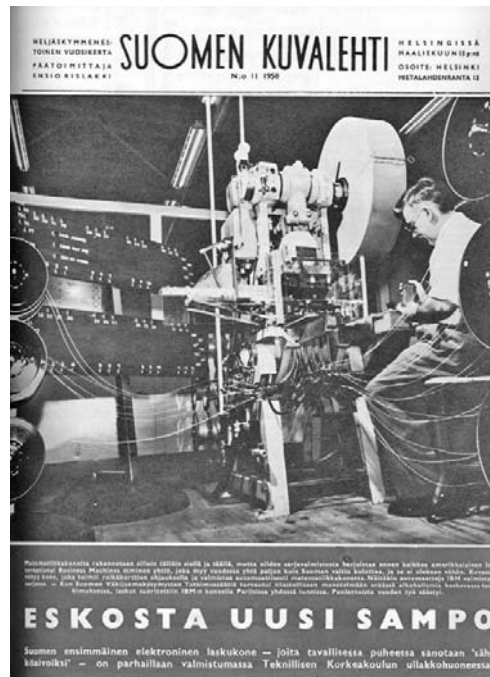


Figure 2. The cover of *Suomen Kuvalehti* magazine in March 1958 promising the ESKO to become a new “Sampo,” and depicting an IBM computer factory in the US. (Courtesy of Yhtyneet Kuvalehdet, United Magazines, Finland)

IBM 650 (and perhaps the 704) at the IBM center in Paris. At the bank, on the other hand, a key employee had previously been hired because he had learned to use the IBM 650 while studying at the University of Michigan in 1956–1957. All in all, this “public” computing center in Helsinki became quite popular and was an important demonstration that ultimately benefitted IBM.<sup>61</sup>

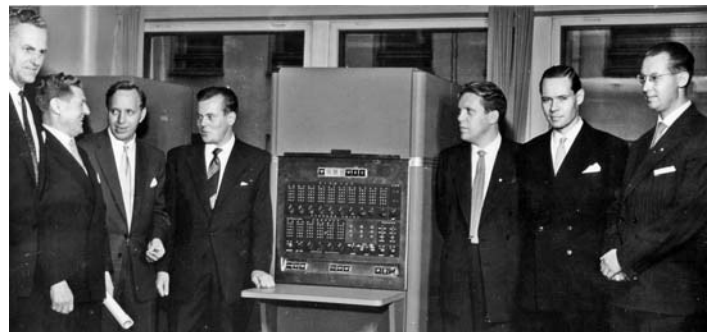


Figure 3. The IBM 650 computer named “First” surrounded by IBM's and its client's personnel, from left: IBM Finland CEO Bengt Grönholm, representative of IBM Sweden Anders Thalme, Post-Savings Bank department manager Sulo Rosenqvist and manager Reijo Pukonen, IBM maintenance operations chief Per-Olof Jonsson, maintenance manager Bertel Ahlman, and salesman and system designer Juhani Savio. (Courtesy of Börge Löfman/IBM Finland Archive)

Likely because of the popularity of this public service activity and most likely the Committee's previous arguments for a computer center, three computing centers were inaugurated in Helsinki by the early 1960s. The ESKO, finalized in the 1959–1960 time frame, was placed in a new computing center at the University of Helsinki, where it was used until 1962. However, its operation was unreliable, and experts regarded a computer using paper-tape programs as obsolete. IBM, too, established its computing service center in Helsinki in the early 1960s. Moreover, the national Committee had the closest connection with—and successor, once the Committee disbanded—in a company called the Finnish Cable Works (*Suomen Kaapelitehdas*), which started another computing center almost concurrently with the University of Helsinki's.

### Enter Nokia

The Finnish Cable Works was the high-tech predecessor of the Nokia Corporation. Like IBM Finland, the Finnish Cable Works obtained expert personnel from the national Committee, which concluded its official work in 1960. The Finnish Cable Works not only initiated a computing center much like the one the Committee had planned since the mid-1950s but, most notably, created its own R&D department to advance domestic know-how in electronics. Several of the earliest researchers were hired from Erkki Laurila's department at Helsinki University of Technology. Thus the Cable Works company, which Laurila also advised, acted in the spirit of the Committee and used revenues generated by the computing service center to build its own R&D department.

Indicative of the department's national role and contacts, many of the Cable Works' early products were developed for the Finnish Defense Forces. The company decided not to even attempt to build mainframe computers but to import Elliot computers from England and Siemens computers from Germany. After the Nokia Corporation was formed in a merger in 1966, the computing center and the R&D department evolved into Nokia's Electronics Department. Nokia, too, owes much of its high-tech expansion to this early "academic," government-sponsored Committee for Mathematical Machines with its techno-nationalist aims.<sup>62</sup>

### Conclusion

In this article, I have explained how the early Finnish computer users and specialists

modified nationalistic goals through international influences, and how Finland's computerization was already far advanced by the time the first operational electronic digital computer was installed in Helsinki in 1958. Before that first computer could be operated, Finnish scientists and others needing computing time could have used several computers, including the BARK, the BESK, the G1, the G2, several IBM 650s and perhaps the IBM 704 (in Paris), the DASK, the Z11 and other Zuse machines—not to mention the G1a's in test use (in Helsinki and Göttingen), analog computers at home and abroad, and some of the many computers in the US. Because of Finland's especially close cultural, political, and personal relations with neighboring Sweden, the Finns occupied an auspicious position in the international field of early computing in Europe.

Whether despite Finland's position between the Cold War blocs or because of it, neither political nor other pressures hindered Finns from using computers. Perhaps this potential access made the absence of a computer inside the country less of a problem and allowed the Finns to wait for computer technology to develop and drop in price (in the 1950s)—this "procrastination strategy" was in fact explicitly, and favorably, referred to in a 1956 issue of *Reikäkortti*, the journal published by the punched-card men's association.<sup>63</sup> IBM Finland effectively supported this strategy by training prospective clients and users before the company could even accept orders for computers. IBM, moreover, provided the Finns with its international resources. These findings suggest that small countries, or their citizens, might have had more opportunities and were more advanced in computing than is apparent when we compare the earliest computers and their launch years in each country.

In terms of computing transfer styles, the Committee for Mathematical Machines, consisting mostly of scientists and an army general, entertained a primarily scientific style of transfer (for the perceived national good); however, they also had commercial plans, and seem to have believed that these interests could be combined. In fact, the years 1955 and 1956 seem to have represented a shift toward a more commercial transfer. It's noteworthy that most of the actors studied here combined elements of scientific and commercial styles of transfer; and so did IBM.

In shaping ideas of computer usage, the Committee for Mathematical Machines, which amply represented prospective users,

was most important in promoting the model of a national computing center. In so doing, they followed the small-country strategy, as shaped and advocated for instance by Eduard Stiefel. In this and other aspects, the Committee's nationalist motives—although not monolithic but varied—contributed to their project. For instance, to Erkki Laurila, the national project of the Committee meant first and foremost the possibility of greater national technological independence, while others would rely primarily on importing the new technology. The Committee and Finland in general used both of these partly competing strategies to build the future technological nation.<sup>64</sup> This finding lends further support to the proposition that cultural factors, such as technological nationalism, should be considered integral to the international appropriation of computing.

The results of my research confirm that considering the national viewpoint as a factor, with its own limits, and emphasizing the user perspective, can contribute new insights into the process of early computerization. Although the individual elements of the Finnish computerization process seem fairly common, it remains a matter of further, probably comparative research to determine to what extent the Finnish combination of strategies and solutions was representative among the interacting nations and organizations.

In the 1960s, Finland would experience rapid computerization.<sup>65</sup> This can be seen as less surprising than before, considering the events of the 1950s I have discussed. In the late 1950s and through the 1960s, IBM Finland kept its predominant position as the “national” vendor, when the punched-card men started to order computers for commercial and administrative data processing. This was due in part to the Committee, which had trained the country's first computing experts—many of whom were hired by IBM. Among Finnish punched-card professionals, IBM was widely recognized as the best available option for computerizing and modernizing their company—and the country. It was in the 1970s and early 1980s that Nokia, having followed the path of increasing domestic know-how, as promoted by the Committee for Mathematical Machines, started to manufacture mini- and microcomputers (the Mikko series) and to really challenge IBM in the Finnish computer market.<sup>66</sup> In the 1980s Nokia was to expand to become a truly international player; not so much, however, in computer manufacture but in other con-

sumer electronics and subsequently in mobile phones.

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  65. See Vehviläinen, "Gender and Computing in Retrospect: The Case of Finland." On later projects by H. Andersin and others, see P. Paju et al., eds., *History of Nordic Computing—HiNC2: Extended abstracts*, Turku Centre for Computer Science, General Publications no. 42, 2007.
  66. R. Lovio, *Evolution of Firm Communities in New Industries—The Case of the Finnish Electronics Industry*, Acta Universitatis Oeconomicae Helsingiensis Series A:92, Helsinki School of Economics and Business Administration, 1993; Häikiö, *Nokia Oyj:n historia 1. Fuusio*, p. 100; Paju, "A Failure Revisited," pp. 92-93; Paju, "Ilmarisen Suomi," pp. 451-455.



**Petri Paju** is a postdoctoral researcher in the School of History, University of Turku, Finland, where he recently earned a PhD in cultural history. Currently, he is researching IBM's various roles in postwar Europe as part of the Software for Europe project group coordinated by a European Science Foundation program. His special interest is history of technology and nationalism.

Contact Paju at [petri.paju@utu.fi](mailto:petri.paju@utu.fi).

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