APPROACHING COLD WAR TECHNOLOGY TRANSFER VIA ORAL HISTORY: A CASE OF FINNISH–ESTONIAN COMPUTING COOPERATION*

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Abstract: *The article discusses the potential of oral history to contribute to Cold War historiography, especially in research concerning technology transfer across the Iron Curtain. It highlights the advantages of oral history when compared to printed historical sources. Examples are provided pertaining to the benefits of oral history when analysing the diffusion of knowledge and technology within a Cold War context. Nonetheless, the limitations of oral history are also discussed. Many viewpoints presented in the article support contemporary Cold War research, which emphasizes the importance of transnational, intermediate-level contacts that occurred across the bloc barriers.*

Key Words: Cold war, Finland, Estonya, cooperation, tehnology, non-written history

ℋ ISTORIANS REGULARLY FACE A DILEMMA when attempting to construct a better understanding of past events: the picture created in the written sources (letters, newspapers, official documents, etc.) concerning a certain historical phenomena is different from the stories told by the people who actually experienced the same event. In these cases, the literal memory can differ significantly from individual perception of the past. Another and maybe even more common problem is that the necessary historical information does not exist in written form at all and the only way to obtain the knowledge in question is to find someone who – in one way or another – participated into creation of this information about the past.

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* The article is a spin-off from a presentation made at the "Challenging the Shadow of the Iron Curtain" seminar in Belgrade on 25.10.2011.

An ongoing study focusing on Finnish-Estonian computing cooperation between the years 1960 and 2000 has attempted to deal with both of the afore-mentioned challenges throughout the entire research process. Written sources con-cerning the topic are limited, and even the existing materials have turned out to be somewhat defective and sometimes even contradictory. As a result of this, oral his-tory has been the best (and in many cases the only) way to create an understanding of the types of transfer of ideas, knowledge and technology that occurred between Finnish and Estonian computer scientists during the Cold War period. In the fol-lowing the pros and cons of this oral history material will be examined. What are the possibilities and limitations of oral history in research focusing on technology transfer during the Cold War era?[1]

Oral history

In contrast to literal sources, such as archival material, magazines, books and contemporary Internet sources, oral history relies on eyewitness accounts of past events. This means information, memories and impressions of the people who ex-perienced the matter under investigation. One of the main strengths of oral history is that it offers new information and different perspectives on past events that can-not be found in the written sources.[2]

For the current study, oral history refers to information and recollections pro-vided by the Finnish and Estonian computer specialists. This oral history material was collected in the course of twelve interviews from persons who participated in computing cooperation between Finland and Estonia (and the Soviet Union) from the 1960s onwards. Face-to-face interviews were organized in Finland and Estonia during the years 2010 and 2011 and each of the interviews took approximately 1–2 hours. The interviews with the computing experts were semi-structured.[3]

Before the meetings, the interviewees received a list of questions, which formed the backbone of the discussions that were recorded and later analysed. Nonetheless, the interviewees did not have to rigorously adhere to the list of ques-tions in the actual "interview session"; rather, they had the opportunity to speak freely, for as long as and as much as they wanted, and to bounce from one topic to another. For the purpose of getting as much information as possible, the role of the

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1   In 1944–91, the Estonian Soviet Socialist Republic was part of the Soviet Union, and for this reason the current research also concerns Finnish-Soviet computing relations. The examples analysed in this article focus more on Finnish-Soviet relations than on dealings with the Estonians.

2   For an introduction to oral history, (see:, *The Oral History Reader* 2006 and Thompson 2000).

3   In contrast to structured interviews, where the respondent is expected to answer a set of exact and well-defined questions that have been decided upon beforehand, semi-structured interviewing is a method based more on discussion between the interviewer and interviewee. During the interview, new questions can be raised, which enables the interviewer to get more detailed information.

interviewer was deliberately minimal. Nonetheless, in situations where, e.g., corrections needed to be made to the information provided, more detailed questions were proposed to the computing specialist in question.

The result of the method described above has been almost 18 hours of interview material about computing history that, to a large extent, does not exist anywhere else. This oral history data forms the single most important collection of source material for a study analysing Finnish-Estonian computing contacts and computer-related technology transfer during the Cold War.

New technology paradigm for the Cold War period

In order to clarify the context within which the Finnish-Estonian computing cooperation took place,this article begins with a brief overview of the post-World War II technological world order. Nonetheless, it was the technology race between the two global superpowers that set the limits for the computing contacts between the Finnish and Estonian specialists.

After World War II, the creation of a new, bipolar world was witnessed everywhere. The race between the Soviet Union and United States had an impact on all sectors of life, and definitely not least on the global technology markets. Although US-USSR relations never escalated into direct armed conflict, military strength became the primary symbol of authority in the global political arena, and both powers invested heavily in their armies and to the development of military technology.

A particular characteristic of Cold War technology was that calculation power became relevant in the strengthening of military muscle in an unprecedented way. During the early years of the Cold War, both the US and USSR realized that they needed to develop their computation abilities to better keep up with technological development: more effective mathematical machinery was a precondition for advanced nuclear weapons and missile defence systems. These military needs were the primary reason why the nations applied vast sums of money to R&D activities on computers[4] in both countries from the beginning of the Cold War. Also, several segments of society were harnessed to this development process: universities, science academies, research centres, industrial enterprises and military forces all played an important role in advancing superpower computing.

Regardless of the fact that the field of computing started to develop rapidly in both countries, it was already apparent in the 1950s that the USSR was lagging behind the US in computer technology. All of the efforts to close the gap proved to be unsuccessful. In this situation, the Soviets turned their attention more and more to their Eastern Bloc allies and to the West in search of advanced computer

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4   Or mathematical machines, which was the correct term at the time. (See: e.g. Gerovitch 2001).   *31*

technology. These efforts culminated at the end of the 1960s when the Soviets decided to decrease independent innovation significantly and began copying western computer technology. The new strategy was targeted especially at civilian computing, whereas independent R&D on computers continued in the military sector.[5] Nonetheless, the strong reliance on Western know-how had devastating effects for computing in the USSR, and it is no surprise that Soviet computer scientists strongly disagreed with the new computing strategy (Merik Meriste 18.11.2011).

The technology gap between the US and USSR was apparent not only in the field of computing; during the latter part of the 20th century, the problem was visible throughout the high-technology sector. The USSR′s innovative output lagged behind that of the US, and in this situation the Soviets tried to compensate for their technological backwardness by transferring technology from more advanced countries. In order to prevent this, the US began to take proactive measures soon after World War II. In 1949, together with its NATO allies, it founded the Coordinating Committee for Multilateral Export Controls (CoCom) as an instrument to impose an embargo on sending high-tech products to Eastern Bloc countries.[6] The embargo motivated theUSSR to develop new ways to acquire technology and R&D-related information and know-how. During the 1950s, the Soviets concluded several inter-governmental agreements with Western countries, including Finland. Finland was the first capitalistic state to establish official scientific-technical relations with the USSR in 1955 (Autio-Sarasmo 2011, 66–68).

On the whole, Finland forms an interesting node in the context of Cold War technology transfer. Traditionally, the country had been politically and culturally orientedtowards Western Europe, but after suffering defeats to the USSR in World War II, Finland′s relations with its eastern neighbour changed. Transformation was evident in the new line of sensitive foreign policy towards the USSR. Close cultural, scientific and technical contacts were also established between the countries during the latter part of the 20th century. Regardless of Finland′s modest scientific and technical output when compared to larger European nations, like West Germany, it gradually became one of the USSR's main partners in S&T cooperation.

Together with strong official-level cooperation withthe USSR, Finland simultaneously maintained good relations with the US. After World War II, Finnish science and technology was primarily oriented towards Western Bloc countries, and individual researchers and engineers in particular had active contact with the US. In proportion to the size of the population, Finland had the most active academic contacts with the US of any European country: at the beginning of the

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5 For the time being, the most detailed description of the development of Soviet computing in English is *Computing in Russia* 2001.

6 For more on CoCom′s role in the Cold War, (see: Førland 2009, McGlade 2005, and Jensen-Eriksen 2011).

1980s one third of Finnish professors and senior researchers had developed their professional skills in the United States (Paju and Durnova 2009, 313; Rislakki 2010, 170, 178).

In addition to the academic contacts, Western technology was also available in Finland. During the Cold War decades when the embargo was in effect, it was possible for Finnish government and companies to purchase American machines, equipment and components, which made Finland a valuable partner for the USSR. At the same time, Finnish companies had to be careful that CoCom-listed technology did not find its way to the Soviets via their products. Nonetheless, in some cases this forbidden technology made its way from Finland to the Soviet Union with US approval. A known example is the contemporary mobile phone giant Nokia, who – with permission from the Pentagon – was allowed to use American components inthe products that it sold to the USSR (Häikiö 2001, 125–128; Autio-Sarasmo 2011, 73–74).

Finnish-Soviet computing cooperation and oral history

Today the official records concerning Cold War computing cooperation between Finland and the Soviet Union[7] are preserved in the archives of the Ministry for Foreign Affairs in Helsinki. The materials mainly include minutes of the meetings, annual reports, cooperation plans and proposals and administrative correspondence (e.g. travel preparations). For a historian, these documents provide an understanding of the types of meetings that were organized as part of computing cooperation, when and where the seminars took place and who participated in them. At first glance, the travel accounts that the Finnish participants had to write after the computing meetings they participated in the USSR might seem more promising source material. Unfortunately, these semi-official documents are more general overviews than detailed descriptions of the content of the computing meetings.

All of the above-mentioned forms of historical information provided by the written sources have been valuable for creating an overview of Finnish-Estonian computing cooperation. Nonetheless, more detailed information is missing regarding *what actually happened* in the meetings of the computing specialists and *how the cooperation materialized*.[8] Thus, the documents do not provide the kind information that is the most valuable for the purposes of this study.

Oral history accounts provide practically the only information concerning the knowledge exchange and technology transfer that occurred between the Finn-

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7   Including the Estonian Soviet Socialist Republic.

8   One important reason why official documents provide only a little information about the results of the cooperation is that computing cooperation only materialized as transnational research projects on rare occasions.

ish and Estonian specialists.The following examples of the information provided by oral history accounts highlight the importance of the cooperative contacts during the Cold War period. Nonetheless, whereas the beginning and the political nature of Finnish-Soviet computing cooperation highlight the possibilities of oral history, illegal technology transfer and secret information gathering are examples of the problems a historian can face when using oral history.

The beginning of Finnish-Soviet computing cooperation

The official computing contacts between Finland and the USSR began in 1970 when a working group on cybernetics was established under the umbrella of Finnish-Soviet scientific-technical cooperation.[9] Before that, collaboration between the computing experts of the two nations was limited to more or less random meetings between individual researchers, e.g. at international conferences. No regular connections existed.

From a historian's perspective, the timing of the cybernetics working group is interesting. In computing history, the year 1969 marks the official beginning of the period of Soviet pirate computing. After that, independent innovation was significantly cut down in the USSR and the country turned its attention to copying and (il)legally purchasing Western computer technology. The temporal simultaneity of the new Soviet computing strategy and the beginning of the Finnish-Soviet computing cooperation raises the question, was there a connection between the two occurrences?

In a situation in which the USSR decided to depend on Western technology that it could not freely purchase, it would have been logical to actively pursue regular contacts with Finland: even though Finland was no global power in computing, it did have direct contacts with US computer scientists and firms. Finnish universities and firms also used Western computer technology. Thus, Finland could have offered one useful channel by which the Soviet Union could acquire computing-related information and know-how; maybe it even offered a route for the illegal transfer of computer technology to the USSR.

Confirmation that there was a connection between Soviet pirate computing and the beginning of Finnish-Soviet computing cooperation comes from the Finnish archival documents: according to the minutes of the Finnish S&T Committee, the USSR proposed to Finland that the two countries should cooperate in the field of computing (Minutes of the meeting of the Finnish Science and Technology Committee 10.4.1970 and 8.5.1970). Based on this kind of archival information,

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9   A working group on cybernetics was just one among the many fields of scientific-technical cooperation that was established between the two countries since the mid-1950s.

scholars have also been tempted to link the Finnish-Soviet computing cooperation to the Soviet´s dubious computing strategy (Autio-Sarasmo 2011, 72).

According to the long-time leader of the cybernetics working group from the Finnish side, JussiTuori, the beginning of the computing cooperation between Finland and Soviet Union had little, if anything, to do with Soviet pirate computing (JussiTuori 1.3.2011). In reality, the roots of the cooperation lie in the strong personal contacts between three individuals: Hans Andersin and JussiTuori from the Finnish Information Processing Association and Academician Anatol A. Dorodnicyn from the Computing Centre of the Academy of Sciences of the USSR in Moscow.[10]

It was Andersin, Tuori and Dorodnicyn who in all but name instigated the process, outlined the details and prepared the official proposal for Finnish-Soviet collaboration. The primary setting for these arrangements was provided by the conferences of the International Federation for Information Processing (IFIP); all three men participated actively in these conferences during the late 1960s as official spokespersons for the national computing organizations.[11] Although cooperation between the Finnish and Soviet representatives never took off at the IFIP conferences themselves, the international computing association provided a platform for the creation of more permanent Finnish-Soviet computing relations.

After Andersin, Tuori and Dorodnicyn had made the necessary preparations, the official initiative for Finnish-Soviet computing cooperation was jointly proposed in 1969 in the name of the institutions that the men represented: the Finnish Information Processing Association and Computing Centre of the Academy of Sciences of the USSR in Moscow. Thus, the plan was not from "the Soviet side of S&T cooperation" as the official Finnish papers suggest, which – at least in theory – would easily link the origin of the collaboration to the Soviet political circles responsible for questions of science and technology. The reason that computing cooperation fell under the auspices of the Finnish-Soviet Scientific-Technical Cooperation Committee was practical: the existing committee provided the most

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10 Hans Andersin(1930–2010) belonged to the group of computing pioneers in Finland and was the first professor of information processing at the Helsinki University of technology. JussiTuori (1940), among other things, was one of the important developers of computing in the Finnish banking sector in the 20th century. For decades, he was also the leader on the Finnish side in the Finnish-Soviet computing cooperation. Academician Anatol A. Dorodnicyn (1910–94) was a long-time director of the Computing Centre of the Academy of Sciences of the USSR in Moscow. He also was one of the founding members of the International Federation for Information Processing (IFIP). Until 1994, he was the representative of the USSR / Russia in the IFIP and he was also president of the organization in the years 1968–71.

11 For decades, the IFIP was the most important international parent organization in computing. It was founded in 1960 under the auspices of UNESCO, and one of its original aims was to bring together computing specialists from the East and West. (See: Tatarchenko 2008).

useful arena from which computing cooperation could be launched, controlled and maintained (Jussi Tuori 1.3.2011).

In the case of Finnish-Soviet computing cooperation, the official governmental authorities did not determine the interaction from the outset. They only gave the final approval. The normal scientific contacts between three specialists from Finland and the USSR constituted the starting point for the inter-governmental collaboration. The fact that individual experts were able to pursue their own goals and develop high-level cooperative plans unofficially among themselves challenges the impression of the Cold War as a period when all forms of cooperation across bloc barriers occurred within the context of rigid governmental control. At the same time, it raises a question: Did this type of unofficial collaboration have a more important role as an initial step in European East-West contacts than has hitherto been acknowledged in Cold War research?

Computing cooperation and politics

A shared experience among the Finnish computing experts is that politics was kept to a minimum in the meetings with their Soviet colleagues. Typically, no pro-Soviet propaganda was presented at gatherings organized in the USSR, and, although official party representatives attended cybernetics meetings, they remained at the background.

In some cases the Soviet side deliberately wanted to keep its distance from politics and focus on computing. In the late 1970s a Finnish computer scientist, who was known to have pro-Soviet political views, spent some months in Moscow as a visiting researcher. Visit was organised as a part of Finnish-Soviet cybernetics cooperation and after it a telephone call was received from Anatol Dorodnicyn who commented rather unambiguously that "they have enough politruks of their own, let's stay in pure science in the future". (Jussi Tuori 1.3.2011 and 22.3.2012). Thus, the Finnish computing experts distinctly recall that the Soviet computing experts did not desire politically oriented individuals as partners – even those in favour of the Soviet ideology.

Two factors need to be taken into account when thinking about the absence of politics in the cooperation between Finnish and Soviet computer experts. First, there is the apolitical nature of computer science. Unlike in social sciences, or, for example, in history, the Soviet political climate only had a small effect on the substance of computer science. Politics of course played an important role when officials sought to define the position of computing in Soviet society after the World War II.[12] Nonetheless, once computing had been publicly accepted as one of the

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12 This fascinating story has been described in Gerovich 2002.

focus areas of Soviet science and technology, no decisive differences existed be-tween Soviet and Finnish (or US, British, German, etc.) computing. In practice, this meant that even if Finnish and Soviet experts had different research interests, they held a similar basic view on the essence of computing.

The second reason for why politics had practically no role in the Finnish-Soviet computing cooperation can be linked to the apparent non-entanglement of Anatol A. Dorodnicyn in Soviet political life.[13] His interests focused on comput-ing, where Dorodnicyn could – thanks to his prominent position in the Soviet computing community – use his influence on many decisions. He was also willing and able to advance the development of the field outside the USSR. The Ukrainian born Dorodnicyn supported the progress of computing systems in several Eastern Bloc countries, and in China he "is considered the father of electronic computing" (IFIP 1996).

Because of Dorodnicyn, it also became possible to form an official Finnish-Estonian computing network. In the late 1980s Dorodnicyn supported the idea that Finland and the Estonian Soviet Socialist Republic could begin direct bi-lateral computing contacts independent of the Finnish-Soviet working group on cybernetics. The study's Finnish and Estonian informants have been unanimous in their opinion that the most important factor behind this decision was the good personal contacts Dorodnicyn had with the key figures in the Finnish and Esto-nian computing communities, including, for example, Jussi Tuori and Enn Tougu from Tallinn Cybernetics Institute (Hannu Jaakkola 15.12.2010; Reino Kurki-Suonio 22.10.2010; Ants Work 19.11.2011).

This example concerning the apolitical nature of East-West computing coop-eration provides additional confirmation of the usefulness o foral history in Cold War research. The interviews with the key figures in the Finnish and Estonian computing communities have provided information that has revealed dealings that, under no circumstances, could have been entered into the minutes or any other official documents.

Illegaltransfers of knowledge and technology: Historical reality or a collective myth?

Oral history is based on the information provided by individuals or groups of people, and, as with any historical information, it can include biased views, col-lective myths and blatant lies. Furthermore, human memory is often erroneous, and, even if this is not the case, informants can easily provide disinformation or

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13 Lithuanian computer scientists have even labeld Dorodnicyn as a dissident who was against the Soviet Government. (Rindzeviciute 2011, 127)

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partial truths in interviews. Thus, in addition to the benefits of oral history, the problems relating to it need to also be discussed.

When analysing the computing-related knowledge exchange and technology transfer between Finland and the USSR, the limitations of oral history have become evident when talking about the illegal transfer of technology. The Finnish informants have suspected that the US computer technology under embargo was transported to the USSR via Finland. Nonetheless, without exception, these views and the examples provided have been based on second-hand information.[14] There are serious problems related to this type of anecdotal evidence and using it for research purposes is problematic.

Another difficult topic is the alleged information gathering that took place at the Helsinki University of Technology (HUT). Even today, it is "common knowledge" among the older HUT engineers[15] that visiting Soviet students and researchers actively copied important journals, technical reports, and so forth; they then delivered these materials to the Soviet embassy in Helsinki. However, so far, no one who could actually verify the secret copying of official documents has been found. It is now known that the Soviet embassy had a library with a good collection of scientific and technical publications (Merik Meriste 18.11.2011). Nonetheless, whether these materials were collected from the HUT or not is another question.

It needs to be emphasised that the aforementioned does not mean that the illegal transfer of computer technology from Finland did not happen or that Western publications were not secretly purchased via the Helsinki University of Technology. Nonetheless, when examining such a sensitive research topic, anecdotal evidence cannot be considered sufficient. Until more detailed information becomes available about the two matters, they remain more as collective myth than as historical reality.

Epilogue

In the traditional Cold War literature, the global division of the world into two competing blocs defines the decades that followed World War II. The political and military race between the East and West is typically emphasised and little space is dedicated to cooperation between the Eastern Bloc and Western Bloc. From individual´s point of view, there seemed to be practically no contacts with the opposite side.

During the last decade, more and more remarks have been heard that attention should also be paid to the interaction, cooperation and contacts that occurred

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14 Typically, the intervieweesdistance themselves from the direct experiences with using expressions like "I heard from…" or "it was generally discussed that…"

15 This was the case not only in computing, but also in, e.g., chemical engineering and nuclear engineering.

across the bloc barriers. These views have materialised, for example, in a large European research project called *Tensions of Europe*,where transnational contacts in Cold War Europe have been one focus area and where several works concentrating on East-West cooperation have been published.[16]

In terms of individual research, Sari Autio-Sarasmo and Katalin Miklóssy have recently emphasised the importance of intermediate-level actors – e.g. cities, universities and civic organisations – when we are seeking to understand the cooperative networks of Cold War Europe. These kinds of actors operated beyond the national level and, in many cases, formed a constant bridge across the Iron Curtain, which made contacts and information exchange possible in circumstances that were otherwise made complicated by the existing political conditions (Autio-Sarasmo and Miklóssy 2011).[17]

The viewpoints emphasised in contemporary Cold War research are in accordance with the results from this study focusing on the computing relations between Finland and Estonia. With oral history, it has become evident that person-to-person interactions and unofficial contacts are of utmost importance when we want to understand the knowledge exchange and technology transfer that occurred across the Iron Curtain. Nonetheless, more case studies are still needed before it can be said how important these contacts were throughout Europe during the Cold War era.

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16 For an introduction to the program and its research, see http://www.tensionsofeurope.eu

17 The research project "Cities and Transnational Interaction. The Cultural Contacts between West and East European Urban Centres during and beyond the Cold War" at Tampere University is an example of a project that analyses intermediate-level actors in Cold War Europe.

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