

Wasiak, P. 2014. Playing and copying: social practices of home computer users in Poland during the 1980s. In G. Alberts and R. Oldenziel (Eds.) *Hacking Europe: From Computer Cultures to Demoscenes*. London: Springer, 129-150.

draft version, for published version, see: <http://www.springer.com/us/book/9781447154921>

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## **Introduction**

This chapter discusses how private users domesticated home computers in socialist Poland during the late 1980s and which social actors shaped computer consumer culture.<sup>1</sup>

Entrepreneurs operating in the informal economy based on international networks and state-owned retail stores provided potential users

indirect access to Western Europe's home computer market. In this way, Polish customers were able to purchase imported hardware platforms that were popular in Western Europe along with the software. The dissemination of imported technology and knowledge shaped the appropriation of scripts for computer use and the development of the local "demoscene" as did advocates of the Polish computerization movement.

My study covers the development of Poland's computer culture in the brief but dynamic period from 1985 to 1989. In 1985, dedicated "computer bazaars" appeared alongside pioneering computer magazines. Both helped popularize home computers among young people. Neither political dissidents nor the fall of the communist regime in 1989 significantly changed computer user practices.<sup>2</sup> The transformation of computer consumer culture only occurred after a copyright protection law was imposed in 1994. The prohibitively expensive IBM PC MS-DOS standard computers were found in some companies and institutions. The first popular hardware platform of 8 and 16-bit home computers in the mid-1980s was the ZX Spectrum, only to be quickly replaced by the Atari XE and Commodore 64 before the Commodore Amiga and less popular Atari ST took over. By the mid-1990s, the PC standard dominated the computer market. Two Polish computers were produced in small quantities (the TRS-80 clone Meritum and the ZX Spectrum clone Elwro Junior) for a few schools. Just like

machines from other socialist countries, they failed to play any significant role in the domestication of home computers.

I focus on the social space where manufacturers, retailers, mediators, and users negotiated scripts using technological artifacts in what has been called the “mediation junction.”<sup>3</sup> This concept originally described the mediation technologies between producers and consumers, emphasizing the role of users as co-producers of technology. Steve Woolgar has discussed the role of computer-technology designers in “configuring the user.”<sup>4</sup> Thus far, social studies of technology have only sporadically recognized the role of home computer users such as in Christina Lindsay’s case study of TRS-80 users.<sup>5</sup> My analysis uses printed sources such as the popular press, computer magazines, computer hobbyists’ interviews and memoirs, along with reader surveys in computer magazines like the Polish *Bajtek*. Its survey showed that of computer users, 97 percent were male; 70 percent were aged between 12 and 17; and 60 percent lived in large cities.<sup>6</sup> According to *Komputer* magazine’s reader survey, 41 percent bought imported home computers abroad; 34 percent bought them with local currency mostly at computer bazaars; and 25 percent in Pewex or Baltona retail stores.<sup>7</sup>

While the state-owned media distinguished between the negative “capitalist” and positive “socialist,” popular opinion subverted this, employing the term “Western” for goods brought from West Germany or the U.S. as positive, modern, and fashionable.<sup>8</sup> The term “Western” was more widely used in the communist period than “European” or “American.”<sup>9</sup> Not only popular culture, primarily music and movies from the West were highly regarded by Poles in the era. Virtually all fast-moving consumer goods and material artifacts manufactured in the West were regarded as superior to domestic products and its possession and consumption was recognized as a significant indicator of both material and cultural capital. Consumer electronics in the 1980s like VCRs, satellite TV receivers, and home computers provided users with access to cultural goods such as movies and computer games produced in Western Europe and the U.S. which were previously unavailable in the Soviet Bloc.<sup>10</sup> In such a context computer culture was appealing as a consumption of “Western” material artifacts which at the same time provided user with interesting practices such as programming and playing computer games.

### **Private Importers**

Monographs on technology transfer across the Iron Curtain usually focus on the policies of state actors like the Coordinating Committee for Multilateral Export Controls (COCOM).<sup>11</sup> The role of non-state actors in the transfer of domestic electronics through the Iron Curtain is still not recognized. The COCOM embargo was not strict in the 1980s, when personal and home computers became popular and obtaining an export license was a mere formality. Moreover, 8-bit home computers were excluded from the list. In the final decade of the Cold War, more and more computers were imported to socialist countries especially Poland and Hungary, where the cross-border flow of people and commodities was relatively easy.

The communist regime in Poland was led by General Wojciech Jaruzelski, who had crushed the Solidarity movement in the early 1980s by imposing Martial Law. Declared on December 13, 1981, this law would only last for a year and a half. The growing social conflict between communist authorities and the underground Solidarity would ultimately lead to the collapse of the communist regime in 1989. The 1980s saw a deepening economic crisis, growing shortages of consumer goods, and hyperinflation. The crisis was somewhat eased by the possibility of foreign travel, with strict restrictions only applied to political dissidents. By 1983, numerous Poles used the restored opportunities for foreign travel to work illegally in West Germany, the UK, Sweden, and the US. Due to an extremely high black market exchange rate for convertible currency, even small sums earned abroad were worth a fortune in Poland. In the 1980s, paradoxically Poles could travel to West Berlin far more easily than GDR citizens. It was customary for them to bring back consumer goods as gifts or items for sale on the domestic black market.

These circumstances led to a flourishing informal economy and the domestication of consumer goods.<sup>12</sup> Aside from coffee and chocolate, difficult to obtain in Poland at the time, commodities such as clothes and consumer electronics were symbols of high social status. With a little luck and a long time standing in line, Poles could buy a Polish or Soviet TV set, radio, or tape recorder in a retail store, but VCRs and home computers were produced in small quantities and unavailable through the official distribution outlets in the early 1980s. Private import was the only way to acquire such commodities. The presence of these objects in households, where they were shown to relatives and friends, increased their popularity. The ensuing demand was met by trade tourists traveling abroad to import consumer goods. Entrepreneurs established profitable trade routes to other socialist and capitalist countries.

West Germany, and especially West Berlin, was the most popular destination for Poles' trade travels.<sup>13</sup> This was described in the official press as black market "economic pathology":

During a tourist excursion to Hamburg, an individual buys a single ZX Spectrum 2 for 120 DM. He brings it to the domestic bazaar to earn 250,000 zł. From hand to hand, no formalities, no efforts. According to the black market currency exchange rate, the person could earn 190,000 zł, a fourfold profit. Even if one needs to subtract the cost of the tour, such travel brings a substantial profit.<sup>14</sup>

To quote the 1986 Customs Office report, imports of 4,590 home computers were declared by private individuals at Warsaw airport. In 1987, the average Polish citizen earned about 30,000 zł per month: a home computer was the equivalent of several months' salary. The disproportion made private import extremely profitable.

Some home computers, for instance Commodore 64 and Amiga arrived equipped with locally appropriated European keyboards. The popularity of two specific keyboards illustrates the transnational trade routes of Polish workers and trade tourists. The most popular were the UK standard QWERTY keyboard with a £ sign, and the German QWERTZ with German diacritics. The latter was perceived as cumbersome and computers with such keyboards were slightly cheaper.

### **Computer Bazaars**

The economy of shortages in state socialist Poland produced an informal economy.<sup>15</sup> Consumer electronics brought in by trade tourists were sold at bazaars, which were a substitute for a free market, based on the rule of supply and demand. In the early 1980s, these bazaars were the main source of imported hardware and pirate software. In 1986, one observer described the largest Polish computer row in "The Persian bazaar" in Warsaw thus:

There is a wide range on offer at the Warsaw bazaar. There is everything from microcomputers and peripherals through software to services like repairs and hardware modifications. There is no problem with the availability of literature. [...] Among computers for sale the most popular are ZX Spectrum and Commodore 64. [...] Certainly, software is also available.<sup>16</sup>

The bazaars also provided the services needed for the daily use of technological artifacts.<sup>17</sup> Aside from bazaars, pirate software was massively copied in numerous “computer studios” – small privately-owned shops, which also distributed software through mail order. The first dedicated “computer bazaar” was established in Warsaw’s Grzybowska Street in 1985 at the initiative of the computerization movement and *Bajtek* magazine in an effort to “civilize the computer market.” In technology enthusiasts’ view, computer bazaars should be sites where computer users instead of entrepreneurs could sell their old computers and peripherals for fair prices. Software would be exchanged on a non-profit basis. In reality, peddlers moved in from other bazaars and quickly took over the supply of hardware and pirate software. The computer movement had not anticipated such practices and would later criticize these bazaars in computer magazines and the popular press for being breeding grounds of shady and unfair economic activities, even as sources of pirate software.<sup>18</sup>

Dedicated computer bazaars did play a significant role in disseminating computer entertainment and developing social networks among users. Dealers in pirate software primarily offered computer games, which after all were more popular than spreadsheets, word processors, and programming language compilers. Software peddlers from bazaars and owners of “computer studios” offered potential clients the opportunity to try new games on the spot. Game reviews and advertisements cut from foreign computer magazines were exhibited on stands with pirate software.<sup>19</sup> At the same time, such sites also played a significant part in disseminating knowledge. You could buy photocopies of English original or homemade translations of hardware manuals and textbooks at various levels of proficiency. Imported computers included manuals in English or German, languages most Poles did not know, since they were usually obliged to learn Russian at school. This factor shaped the demand for computer knowledge in Polish and led to the mass production of bootleg translations of manuals as well as the authorship of such books by Polish authors.<sup>20</sup>

Smaller computer bazaars were established during the late 1980s in most Polish cities. These survived until 1995, when the police started regular anti-piracy raids as a result of the Copyright Protection Act. Computer bazaars played a pioneering role, and after 1989, they evolved concurrently with the growing industry of legal software retailers.<sup>21</sup>

## **Pewex and Baltona Retail Stores**

During the late 1980s, Pewex and Baltona state-owned dollar retail stores offered consumer electronics along with other Western consumer goods because of their growing popularity. This so-called “internal export” aimed to collect hard currency from citizens to pay back Western loans from the 1970s, which was a matter of urgency for Poland’s economy in the 1980s. Pewex was a counterpart of the better-known East German Intershop, where you could also purchase home computers. Both companies chose the Atari XE as their hardware platform. A market failure in Western Europe, the XE model was introduced to Eastern Europe with an extensive marketing campaign and at a relatively low price.<sup>22</sup> Atari computers became very popular among Poles for two reasons. Both retail stores’ networks were considered sources of the best brands of Western consumer goods. Poles tended to perceive anything sold there not merely as good quality but also as a luxury item. Pewex in cooperation with state-owned company Karen was the first retailer in Poland to provide warranty services for their computers.<sup>23</sup> Both companies developed marketing strategies such as the first full-page color advertisement for a home computer published in *Bajtek*, featuring an Atari 130XE with the slogan “Atari – computer for a Christmas gift” and a small Pewex logo.<sup>24</sup> Atari was sold in Pewex at the same price as the Commodore C-64 in computer bazaars but became more popular despite a smaller choice of software. As both retail chains wanted to increase their profits, the computers were marketed primarily as game platforms – probably perceived as the most attractive script for potential consumers – and offered with a games package.<sup>25</sup>

## **Computerization Movement**

The computerization movement played an equally significant role as intermediary in expanding computer use.<sup>26</sup> The broad coalition included the Polish Association of Informatics (Polskie Towarzystwo Informatyczne, or PTI, founded in 1982), activists from the Association of Polish Socialist Youth (Związek Socjalistycznej Młodzieży Polskiej, ZSMP), and journalists from *The Young Technician* (*Młody Technik*) magazine involved in the popularization of technology.<sup>27</sup> Their aim was to lobby among party decision-makers to increase investments for disseminating computer technologies and promoting computers to ordinary citizens:

We are convinced that a country unable to develop autonomous systems for gathering, processing and making available information could not become a rightful member of modern civilized

community. We seek public understanding of the necessity for state patronage over applications of informatics.<sup>28</sup>

PTI members tried to achieve their goals by participating in numerous bureaucratic advisory committees. They also promoted the dissemination of computer technology in media interviews, like in *The People's Voice* (the press organ of the PZPR – the Polish United Workers' Party), the ruling communist party, and computer magazines. PTI experts presented computerization as a crucial agent of social development, indeed as a silver bullet to increase the efficiency of a planned economy in decline. Combining computerization with the vision of socialist modernization, they sought to influence high-ranking party leaders and simultaneously promote responsibility among computer users. The chairman of PTI appealed with typical communist propaganda:

The computer hype concerns only entertainment informatics. Computer toys are merely an unimportant episode and the cheapest method in the communion with the West. [...] To achieve the real, not merely spectacular, benefit from the dissemination of informatics, intellectual and material concentration of efforts should come soon.<sup>29</sup>

Officially, computerization in Poland was called “The game for tomorrow” (“Gra o jutro”). Young people were encouraged to use computers exclusively for “serious purposes” instead of entertainment. For instance, an editorial in *Bajtek* in 1989 criticized computer entertainment for its failure to increase “the actual output of national economy.”<sup>30</sup> Young users were supposed to improve their knowledge of computers and programming skills to help computerize companies where they would work as adults. Appeals voiced in this tone had virtually no impact on the domestication of home computers. One success of the computerization movement was the implementation of a computer education program based on obligatory programming courses in LOGO and BASIC in selected schools; however, due to the lack of funds and trained teachers, the project had a rather limited social impact.<sup>31</sup>

### **Computer Magazines**

The most influential Polish computer magazine in the late 1980s was *Bajtek*. The title was an intentional reference to the term “byte” and the American magazine *Byte*. Established in 1985, *Bajtek* targeted current and potential young users of home computer and was modeled after the English-language magazines *Your Computer* and *Compute!* The second Polish magazine,

*Komputer*, established in 1986, with a similar format to *Byte* and *Chip*, addressed a readership interested in using computers in their professional careers. *Bajtek* was popular among the Polish youth and played an important role in disseminating computer knowledge. Published under the auspices of ZSMP, *Bajtek* became a major media channel for the computerization movement. Its first issue in 1985 clearly stated the goals of the coalition:

*Bajtek* is a popular magazine dedicated to all issues linked with information processing. Our aim is to help everyone who owns, or would like to own a computer. There is no point in talking about the significance of development of microcomputer technologies for all societies. [...] We would like only to add that this cause is CRUCIAL FOR THE PROSPEROUS FUTURE OF OUR COUNTRY. Our ambition is to fight against computer illiteracy. We seek the help of all who have some experience in fighting for the cause of informatics.<sup>32</sup>

Every issue began with a similar propaganda editorial. A section entitled “The game of tomorrow” included interviews with computer experts, scientists or professionals who were using computers. Sometimes there were enthusiastic reports on computerization in the Soviet Union. However, that was the only political part of *Bajtek* and the rest of the content resembled Western computer magazines. The news section featured information from Silicon Valley and the Far East. There were sections dedicated to Spectrum, Atari, and Commodore hardware platforms including entry-level information on computer use, programming courses, software listings in BASIC, and blueprints for hardware hacking. Type-in listings were published with extended comments mostly for educational purposes; readers were encouraged to modify programs to understand the principles of programming. The opportunity to learn programming skills was acknowledged by many user testimonials. “I started with playing games. [...] First, I was learning BASIC commands. Then *Bajtek* came along. I was typing listings of programs published in *Bajtek* and *Komputer* and this way I learned how to program.”<sup>33</sup>

There was also a section on computer games called “What’s going on?” (“Co jest grane?”). Aside from reviews of new titles and a top-ten list, the section featured numerous instructions on how to modify games to get unlimited lives etc. The editors sought to encourage children to understand how programs were structured. They expected that after a short period of fascination with computer games, children would turn into “serious” computer users.



Publishing tutorials of game modifications could be perceived as a form of offering entry-level programming courses.

A group of young informatics students edited *Bajtek* and wrote most of its content, while providing unlicensed translations of articles from foreign magazines. The editorial team encouraged readers to send in their own programs and hardware hacking blueprints to the “Do It Yourself” (“Zrób to sam”) section. Such content, submitted by more experienced users, was often published. Klaudiusz Dybowski, who later became an activist in Commodore users’ circles, recalls:

In mid-1985 I got *Bajtek* for the first time. After reading it, I decided to write to the editorial team to boast about my “hardware hacking” achievement: the signaling device for Datasette tape recorder [...]. My article was approved and I was invited to an editorial meeting. [...] A decision was made and I became a member of *Bajtek*, responsible for Commodore 64.<sup>34</sup>

Most published blueprints had more practical purposes. Due to the high costs and shortage of peripherals, interfaces and connecting cables, homemade peripherals and hardware modifications were popular in Poland. The frequency of articles instructing how to make a hardware modification with little knowledge of soldering, illustrates the popularity of such practices.<sup>35</sup> *Bajtek* also published content for potential users, with advice on the choice of computers depending on personal interests and needs. Every issue published the price list of computers available in Poland, along with current prices in West Germany and the UK. The topic of mass software piracy was often discussed, the editors claiming that nothing could be done in the absence of proper copyright protection legislation and legal software retailers. Despite such discussions, every issue contained dozens of classified advertisements for computer studios.

*Bajtek’s* editors never stopped expressing their aim to promote “serious” scripts despite the proportion of the magazine devoted to computer games. This was the most popular section as in a 1988 reader survey, 60 percent of respondents claimed they read it regularly.<sup>36</sup> Shortly after 1989, confronted with the harsh rules of the free market, *Bajtek* had to become profitable. The editorial team simply established *Top Secret*, a new commercial title, and the first Polish computer games magazine. It became very popular in the early 1990s and played a

significant role in gaming culture. At the same time *Bajtek* quickly lost its popularity to new magazines targeting users of specific platforms, especially Amiga.<sup>37</sup>

### **Communist Sanctioned Computer Clubs**

The computerization movement promoted computer clubs in order to provide young people easy access to computers and programming courses. Such clubs were mostly established under the auspices of ZSMP, local housing associations, state-owned companies, and schools. According to The Central Office of Statistics, in 1993, at a total of 3,792 state-sponsored cultural centers, 842 had computer clubs, 422 with computer rooms. The clubs totaled 15,283 members, including 11,499 children under 15.<sup>38</sup> Computer enthusiasts' testimonials show that computer clubs were often children's first contact with computers. The political framework of computerization that came with socialist state funding was demonstrated by the emphasis on "serious" scripts for computer use in information about club activities. Numerous clubs advertised their activities in *Bajtek* to attract new members:

As "dissemination of informatics" we understand all activities which aim to familiarize youth (but not only them!) with the principles and the architecture of computers, learning of programming etc. We emphasize such forms of activity because we know about some "clubs" where microinformatics is disseminated with the help of computer games. Of course, we are also staging such events, but these are marginal to our activity.<sup>39</sup>

Theoretically, most clubs primarily offered courses in handling computers and programming, LOGO and BASIC being adopted as the most suitable languages for young people. In practice, however, things were rather different. In some clubs, computer games were a form of recreation allowed during pauses between courses, or as a prize for solving programming tasks. One user remembered how easily he adapted to both scripts of computer use:

In 1988 the authorities of Nowe Miasto housing district in Rzeszów decided it was time to undertake informatics education of the youth. The local culture center was full; the interest in proposed courses outgrew expectations of the authors of this idea. [...] I also remember how we were waiting for pauses between courses. Not because we were not interested in them but we were just waiting to play *Bomb Jack*, *Batman* and *Yie Ar Kung-Fu*.<sup>40</sup>

The year 1989 and the fall of the communist regime marked the end of the computer clubs. ZSMP was disbanded and local, state-owned companies withdrew most of their support due to financial difficulties. Also, users' interest in clubs declined. With the prices of hardware dropping and wages increasing, far more potential users could afford a computer of their own. No longer were crowded clubs the exclusive sites of access to computers. By the 1990s, there was no mention of computer clubs in computer magazines.

### **Social Networks, Gaming Culture, and Sneakernets<sup>41</sup>**

Popular books on computer games tend to present gaming as the natural route towards domestication of home computing.<sup>42</sup> The literature describing how social actors were responsible for the process is limited. In Poland, intermediaries in technology and social networks significantly shaped the popularity of computer games. Two main actors at the mediation junction stimulated the use of computers to play games: First, *Bajtek* offered readers attractive reviews of new games available in Poland along with color screenshots. Second, retailers of pirate software at computer bazaars actively promoted gaming scripts.

According to user testimonials, the first opportunity to see and touch a real home computer was through social networks. "I was about 10 when my grandma took me to a party at her friend. Her son owned a Commodore 64. I went crazy. It was love at first sight."<sup>43</sup> In a 1988 *Komputer* reader survey, of the readers not owning a computer, 60 percent responded that a friend gave them the opportunity to access a computer. Only 17 percent said they gained access through a computer club and 12 percent through their workplace.<sup>44</sup> Users indicated that playing games was the first script of computer use learned during accessing a home computer owned by a relative or a friend.

Physically I was able to touch this "wonder" which belonged to a friend of my parents. He was relatively rich and probably bought the Atari merely as a curiosity. He used the computer to get rid of me and my brother during family visits. I was about 12 then. I scored most of classic games, for instance *River Raid* and *Montezuma's Revenge*.<sup>45</sup>

Such contacts played a significant role in mediating future scripts for computer use and peer social networks influenced the choice of hardware. One Atari user described how he became adept even before owning one:

I liked mostly going “for a computer” to my colleagues – owners of the toy with Fuji mountain in a logo. I was a frequent guest at the homes of owners of this hardware and I “chopped” games with hypnotic fascination. It was clear that if I was going to have a computer it MUST be an Atari.<sup>46</sup>

Users in the peer group were the crucial mediators of technology.<sup>47</sup> Choosing the same home computer as one’s colleagues was practical since social networks were the most important source of software. Conversely, home computers shaped the social identity of young users. A journalist reporting on young computer aficionados at a Warsaw computer bazaar described the identities taking shape:

Mostly primary and secondary school children are here. [...] They know everything: what, where, and how, how much it costs and if it is modern. [...] They know how to use computers; they are knowledgeable about technical details. Moreover, they are building closed clans of “Atarians” (“atarowcy”), “Spectrumians” (“spektrumowcy”). Their free time is dominated by computers. [...] Contact with a computer is a substitute for the family, peer group, friends.<sup>48</sup>

While the writer worried that the computer was perilously breaking down social networks among the youth, in fact, home computers were forming new social identities based on the various hardware platforms. Shared gaming as a cultural and social practice could strengthen existing social networks:

My first computer was Atari 65 XE bought at Pewex. I couldn’t sleep at all when I was aware that the object of my desire was just a few meters away. I borrowed some cassettes from my colleagues and I was simply playing all the time for a few weeks. [...] My colleague A.G. had similar interests. We were attending the same secondary school; our apartment buildings were located opposite each other. Instead of attending school lessons, I was just going to his place on mornings and, well, we were just... creating.<sup>49</sup>

Several computer games had a two-player option enabling competition, which was obviously popular considering the classified advertisements in computer magazines. Most sellers of 8-bit computers offered two joysticks, further peripherals and hundreds of games. Gamer contacts built up networks to exchange tapes and disks with software, so called “Sneakernets.”

At the beginning I was exchanging games with my friend who dragged me into the C64-atmosphere. After a while we exchanged all software we possessed and we simply haven't got any new games.<sup>50</sup>

A 1991 *Top Secret* reader survey reveals the social and economic practices linked with software distribution. The provenance of software could be a friend, indicated by 85 percent of respondents, a computer shop (a “computer studio”), 60 percent, a computer bazaar, 50 percent, school (copying games from schoolmates), indicated by 10 percent, or “the West”, 10 percent.<sup>51</sup> The survey shows how universally the distribution of pirate software relied on personal networks. Sneakernets operated alongside the commercial software piracy market. It was customary to distribute newly acquired games among close colleagues: “In those days we hadn't even thought about “copyrights”, we were copying games from each other. A mine of software was the computer bazaar at Grzybowska Street.”<sup>52</sup> The 10 percent claiming their games were from the West, brought software from personal trips, downloaded from Bulletin Board System nodes, which became popular in Poland around 1989, or used personal networks in the demoscene.

Some users went further and experimented with programming, thus breaking away from gaming and using a novel script. Paweł Sołtysiński, a pioneer of the Polish demoscene, better known by his alias Polonus, described a typical trajectory of changing scripts:

At the beginning there was a massive fascination with computer games. [...] People were just playing, playing, and copying games, and then still playing, and playing. Fortunately, some people were able to break away from the closed circle of “playing and copying.” They started programming on their own. They succeeded in making the first Polish demos, educational and other kinds of software.<sup>53</sup>

Gamers succeeded in learning to program by experimenting with game modifications and copy protection removal. Fundament programming in BASIC and higher level languages could be acquired through experiments with simple listings in *Bajtek*. However, game modifications could not be achieved with higher level languages alone. Modifying computer games required basic knowledge of machine code, which could be learned from an experienced colleague, special articles in *Bajtek*, or bootleg photocopies of programming textbooks available in computer bazaars. Such was the knowledge required for the practical

purposes of distributing games among colleagues and which could be used later in new cultural contexts when one entered the demoscene.

## User Groups

Social user networks and Sneakernets sometimes evolved into formalized user groups customarily called “computer clubs” – but not to be confused with the state-sponsored clubs discussed previously. The phenomenon of computer user groups was analyzed by Frank Veraart in the case of the Dutch Hobby Computer Club (HCC).<sup>54</sup> In Poland, the first user groups were established in the mid-1980s mostly initiated by private users seeking contact with users outside their local social milieu. Each group had one specific hardware platform and in Poland the popular platforms were the Atari XE, the Commodore C64, the Sinclair ZX Spectrum, and later the Commodore Amiga and Atari ST. The largest user group in the late 1980s was “Commodore Clan Komoda”, counting 2,374 registered members in 1989.<sup>55</sup> User groups collected software libraries, publications and periodicals, making them available to all members. *Bajtek* offered user groups the space to introduce themselves. Here is the list of activities of “Klub Użytkowników Atari” (Atari User Club) from Cracow:

- Subscription to Western Computer magazines: *Compute*, *Antic*, *Analog*, *l'Atarien*, *Atari User*, *Atari Connection*, *A-Z of Personal Computers*
- Organization of warranty services for Atari computers in cooperation with Pewex, the official Atari retailer
- Publishing a book on Atari BASIC and plans for a textbook with commands for the 6502 processor
- Collection of about two thousand programs<sup>56</sup>

The larger clubs were not just providing a platform for social activities and sharing know-how among members. They could also become important mediatory institutions, promoting a particular model of hardware by providing services and software to attract new users and potential club members. For some members, user groups were merely convenient providers of free software. Others added their programs to the software library, and spread their amateur software in the public domain. User groups also organized copy-parties where attendees copied software on a non-profit basis. Similar events were later organized among members of the demoscene.

The Dutch HCC, according to Veraart, was shaped with knowledge about clubs in the UK and the US.<sup>57</sup> Similar factors may have influenced user group culture in Poland. *Bajtek* user groups claimed that, aside from ordering Western computer magazines, they had direct contact with clubs in Western Europe, the US and even Australia. *Komputer* regularly published HCC activities based on the editors' personal contacts. Brief reports about clubs in Western and socialist countries were published in both magazines.<sup>58</sup> Contact with foreign clubs probably played a rather symbolic role in providing members with the awareness that they belonged to a global technical culture.<sup>59</sup>

The founder of the first Polish Amiga user group claimed that his club was based on Commodore Clan Komoda:

We thought of establishing the Amiga Commodore Club for our convenience. In 1988 in Poland there were about 100, maybe 200 owners of an Amiga. The possibilities of communication among us were limited. If you wanted to have new games, you had to get the train and travel far away, sometimes to the other end of the country, in order to copy them. We concluded that if we would establish a club, other users would travel to us, and we would be relieved from the need of uncomfortable travels. [...] We were deeply inspired by the club of C-64 users excellently run by Marek Pampuch.<sup>60</sup>

Accounts show that the user groups aimed to provide members with software and knowledge, rather than a strong social identity. User groups were therefore often short-lived and disappeared completely in the early 1990s when computer bazaars and computer studios took over their role as software source. Knowledge was provided by new computer magazines devoted to specific platforms, especially Amiga, the most popular home computer at this time. Unlike HCC, Polish user groups never became long-lasting social structures beyond the small group of founders and activists, who later moved away to work on the editorial teams of the new computer magazines.<sup>61</sup> Earlier, the platforms had provided users with an identity and an opportunity for social activities. The user groups were less successful in this role. For offering identity, the platforms were replaced by the demoscene, which reached its peak in the first half of the 1990s.

### **The Demoscene**

Hacker culture appears to have taken on specific European forms in the “cracking scene” and the “demoscene.”<sup>62</sup> The computer-oriented subcultures, sometimes referred to as just “the

scene”, grew quickly during the mid-1980s in West Germany, the Netherlands and Scandinavia. Young gamers with programming experience took the appropriation of home computers a step further. They started to “crack” games - that is make software modifications to remove copy protections and provide players with cheats, like “unlimited lives”. Modified software would then be spread among computer users in the neighborhood, to groups in other regions, and even in other countries. The technique was to mount a “crackintro” onto the modified game, a short visual presentation with messages to other members of “the scene.” It was around the Commodore C64, the most popular home computer in Western Europe, that the most vibrant subculture appeared. In the late 1980s “crackintros” evolved into demonstration programs, “demos”: independent audio-visual presentations written as executable files. The mark of distinction in creating these artifacts was to compete for the highest efficiency in programming the most spectacular graphic and sound effects. A form of journalism specific to the scene cemented the subculture. Hundreds of “papermags” and electronic “diskmags,” or “zines,” were published and spread through private mailing lists.<sup>63</sup> From the beginning, members of the subculture perceived it as an international community in which nationalities played a minor role. Theoretically, every talented C-64 user with advanced knowledge of programming or creativity in computer graphics and music could join. This openness greatly facilitated the spread of the subculture in Europe. Contrary to the user groups’ heterogeneous activities, the demoscene was homogeneous, with a set of codified customs and practices. Members of “the scene” were supposed to regularly spread copies of games with their crackintros, release their own demos, and publish diskmags.

In Western Europe, the scene began with peer groups in local, social networks. In Poland, most early sceners made further contacts during visits to computer bazaars, some of which resulted in the creation of local scene groups.

My first computer was a Commodore Plus/4. [...] It was a decent computer due to an implemented machine code monitor. This simply lured me to do something in assembler. Later I learned about a computer bazaar in Warsaw. I decided to go there. At the bazaar I met a group called KLC who were working on Commodore Plus/4. Those were cool people; it was great to talk with them. We copied software and exchanged experiences in programming.<sup>64</sup>

Easy access to Western cracked software, along with opportunities to meet other users with similar interests, led to the growing popularity of “demoscene” activities in the late 1980s.



According to a detailed online database of C-64 scene activity, 11 groups with 33 members were active in Poland before January 1, 1990 and 118 software artifacts: crackintros, demos, and diskmag were produced during that period.<sup>65</sup> In Western Europe there were thousands of sceners and many thousands of software products, but in Eastern Europe, only the Hungarian sceners' activities in the late 1980s could compare in volume to the Polish.<sup>66</sup>

The first crackintros and demos appeared in 1988, published by groups from Warsaw and the port city of Szczecin. Along with imported pirate software, early demos were brought to computer bazaars where you could get information about the demoscene as a social phenomenon and learn new programming techniques. Polish groups adopted English names and their members used aliases. The most significant groups founded in the late 1980s were called Quartet Inc., The Housebreakers, and World Cracking Federation.<sup>67</sup> Members of the Polish demoscene continued to use the term "the world scene" to refer to well-known groups from Western Europe and their software artifacts circulating in Poland. One early Polish scener with the alias TG JSL recalled: "We were watching demos to see who invented something new and who was active on the scene in Europe. Of course, as a coder, I was looking inside to see how the demos were made."<sup>68</sup>

To be a member of the demoscene, aside from knowledge about production and distribution of software objects, one needed to be proficient in machine code programming. "Fun begins when one trespasses the barrier of games and BASIC, and enters into the world of machine code and everything linked with it: demos, cracks etc."<sup>69</sup> Information on learning the tricks was scarce in computer magazines. The first tutorial on machine code in *Bajtek* was not published till 1989, more as a response to the growing popularity of demoscene practices. Sołtysiński mentioned social learning through sharing experiences with other users, but some sceners learned it themselves.

Everything I liked (copy protections, intros, demos) was written in 100 percent machine code. It was necessary to learn it, so I started this on my own. I was learning to crack copy protections. If someone from my neighborhood traveled to West Germany, I would ask for current issues of *64'er*, *INPUT64* and *Magic Disk*. We also had single issues of *American Compute!* and *Compute!'s Gazette*.<sup>70</sup>

Polish sceners established contact with Western groups through private addresses published in demos and diskmag. <sup>71</sup> “We were surprised because we even received some responses. When we saw the quality of Western demos, we were depressed by our own productions.” <sup>72</sup> Rare in the late 1980s, the number of contacts grew in the early 1990s, when some Polish sceners joined Western international groups, and interviews with foreigners were published in Polish diskmag. Polish texts featured in well-known international publications, and finally a few elite Polish groups were included in international “charts”, regular rankings of groups based on readers’ votes. Sołtysiński joined the well-known groups Science 451 and Padua:

I realized that I was the only coder in Quartet doing exciting things. It was 1989 when I made my first music editor called Voicetracker. That was my ticket to join Science 451. Living in Szczecin, I could visit people in Berlin but not in Sweden (where most S451 members were living). So I easily searched one group in Berlin, someone tipped me off - maybe Padua? I wrote a letter, they became aware of who I was, and I joined the group. <sup>73</sup>

Poles effectively established contact with demoscene members abroad, receiving software objects and joining West European groups. Their interest in other East European countries was minimal except for the scene in Hungary, which was perceived as part of “the world scene.” Poland did play a mediating role in shaping computer practices in Russia in the 1990s. The eastbound dissemination involved pirate software with Polish crackintros rather than demoscene content:

Software was not a big problem either – traders traveled to the socialist European block, countries like Czechoslovakia and Poland, where cracking groups already existed, [...] and programs were easy to get hold of. The first Polish demos reached Russia that way. As far as I know, in the early 1990s some Russian coders decided that they were better than the Polish, so they made their own demos. <sup>74</sup>

## **Conclusion**

In the 1980s, Polish users appropriated home computers in the social, political and economic realities of the Soviet Bloc, part of which was a significant informal economy. Poland’s computerization movement, in its efforts to cope with the political framework, offered contradictory scripts and promoted attractive domestically-produced home computers and scripts. The years between 1985 and 1989 were crucial for home computing developments in

Poland. Initially a high-tech luxury gadget, the home computer soon became an entertainment platform, and to use Sherry Turkle's phrase, "a second self."<sup>75</sup> Still a status symbol, the home computer did not become an everyday, affordable object till the 1990s.

A young potential user, whose parents could afford his dream machine, might become a devoted gamer, a frequent visitor to computer bazaars, and proficient in "playing and copying." If on top of that he managed to learn machine code, he would evolve into a hacker: a member of the demoscene. The ease and selectiveness shown by young users in coping with the high threshold to access the technology and limited scripts are remarkable. Young people could visit a computer bazaar, an offshoot of the socialist economy of shortages, to obtain new software. They could read computer magazines adorning program listings with messages that typing those programs helped to strengthen the socialist economy. Having read those listings, they would reject the political messages then check the game review section to prepare for their next visit to the bazaar. They could select and shape an identity.

The domestication of the home computer in state-socialist Poland was definitely a cross-border phenomenon as its dissemination was based on importing cultural trends, material objects, and information from "the West." Developments in domestic electronics depended on the cultural distinction between "socialist" and "Western" objects. It would be useful to include such categories in further studies of the cross-border domestication of technologies in post-war Europe.

Potential users could choose to be either an Atari or a Commodore user – in both cases implying strong loyalty to American consumer electronics brands. No official presence of the companies was required; for computer users, both brands were just "Western." If a user defined himself as a hacker, or to be more specific "a scener," he shaped his own identity as a member of an international informal community established only a few years earlier in West Germany. The image of young Poles owning a home computer demonstrates that users actively participated in socially constructing home computer technology.

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<sup>1</sup> This article was written with the support of The Andrew W. Mellon Foundation Fellowship at the Netherlands Institute for Advanced Study in the Humanities and Social Sciences, and a research grant from The Society for the History of Technology. I would like to express my gratitude to Gerard Alberts, Ruth Oldenziel, Markku Reunanen, and Antti Silvast for valuable comments on my manuscript.

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<sup>2</sup> Home computers were very rarely used for editing samizdat magazines. One well-known case was when a ZX Spectrum helped to locally scramble the state TV signal and enabled pirate broadcasting of a Solidarity statement lasting a few minutes. See: Buck Bloombecker, *Spectacular computer crimes* (Homewood: Dow Jones-Irwin, 1990) <http://w.icm.edu.pl/tvS/tvs.htm> (accessed December 20, 2010).

<sup>3</sup> Madeleine Akrich, "The De-Description of Technical Objects," in *Shaping Technology/Building Society: Studies in Sociotechnical Change* Wiebe E. Bijker and John Law eds., (Cambridge and London: MIT Press, 1992), 205-224; Ruth Oldenziel, Adri Albert de la Bruhèze, and Onno de Wit, "Europe's Mediation Junction: Technology and Consumer Society in the XX Century," *History and Technology* 21, no. 1 (2005): 107-139.

<sup>4</sup> Steve Woolgar, "Configuring the user: the case of usability trials," in *A Sociology of Monsters: Essays on Power, Technology and Domination*, ed. John Law (London and New York: Routledge, 1991), 57-102.

<sup>5</sup> Christina Lindsay, "From the Shadows: Users as Designers, Producers, Marketers, Distributors and Technical Support" in *How Users Matter: The Co-Construction of Users and Technology*, Nelly Oudshoorn and Trevor Pinch, eds. (Cambridge and London: MIT Press, 2003), 29-50.

<sup>6</sup> "About 5000 respondents," *Bajtek* (June 1989): 4. Because these were predominantly male, I will refer to single users as "he."

<sup>7</sup> *Komputer* (February 1988): 8.

<sup>8</sup> *Nylon Curtain* is the metaphor invoked to describe the flow of cultural phenomena across the Iron Curtain: György Péteri, ed., *Nylon Curtain. Transnational and Transsystematic Tendencies in the Cultural Life of State-Socialist Russia and East-Central Europe* (Trondheim, TSEECs nr 18, August 2006).

<sup>9</sup> See: György Péteri, ed., *Imagining the West in Eastern Europe and the Soviet Union* (Pittsburgh: University of Pittsburgh Press, 2010).

<sup>10</sup> Almost all domestic electronics were brought to Poland from Western Europe. Despite frequent travels to the U.S., the import of home media electronics was rare due to the incompatibility of the American NTSC analog television system with PAL and SECAM used in Europe, and differences in voltage.

<sup>11</sup> For technology transfer during the Cold War see: Gary K. Bertsch, ed., *Controlling East-West Trade and Technology Transfer: Power, Politics, and Policies* (Durham: Duke University Press, 1988); Frank Cain, "Computers and the Cold War: United States Restrictions on the Export of Computers to the Soviet Union and Communist China," *Journal of Contemporary History*, 40, no. 1 (Jan., 2005): 131-147; Michael Mastanduno, *Economic containment: CoCom and the politics of East-West trade* (Ithaca/NY: Cornell University Press, 1992); Paul N. Edwards, *The closed world: computers and the politics of discourse in Cold War America* (Cambridge and London: MIT Press, 1996).

<sup>12</sup> Case studies of consumerism in socialist countries can be found in Susan E. Reid and David Crowley, eds., *Modernity and Material Culture in Post-War Eastern Europe* (Oxford and New York: Berg Publishers, 2000); Susan E. Reid and David Crowley eds., *Socialist Spaces: Sites of Everyday Life in the Eastern Bloc* (Oxford and New York: Berg Publishers, 2002).

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<sup>13</sup> The impact of trade tourism on consumer culture in Poland is discussed in: Ursula Weber, *Der Polenmarkt in Berlin: zur Rekonstruktion eines kulturellen Kontakts im Prozeß der politischen Transformation Mittel- und Osteuropas* (Neuried: Ars Una, 2002); Małgorzata Irek, *Schmugglerzug Warschau-Berlin-Warschau: Materialien einer Feldforschung* (Berlin: Das Arabische Buch, 1998).

<sup>14</sup> Jerzy Szperkiewicz, "Skąd się biorą komputery?" (Where computers came from?), *Horyzonty Techniki*, 1987, special issue 64 *strony o komputerach* (64 pages on computers), 34.

<sup>15</sup> Alejandro Portes, Manuel Castells, and Lauren A. Benton, eds., *The Informal Economy: Studies in Advanced and Less Developed Countries* (Baltimore and London: John Hopkins University Press, 1995); Janine Wedel, ed., *The Unplanned Society, Poland during and after Communism*, (New York: Columbia University Press, 1992).

<sup>16</sup> Roman Poznański, "Informatyka na Perskim," (Informatics on the Persian Bazaar) *Bajtek* (October 1985): 24-25.

<sup>17</sup> One popular modification was tuning TV sets produced in Poland and the Soviet Union from SECAM to PAL signal system to work with home computers and VCRs bought in Western Europe.

<sup>18</sup> After numerous appeals, *Bajtek* finally withdrew its patronage from the Warsaw bazaar in 1989 due to mass piracy and shady businesses. The decision had minimal impact.

<sup>19</sup> Pirate software was also distributed through a mail-order system. In catalogues of pirate software available in Poland, games constituted about 70 percent of the programs. A list of catalogs is available on <http://atarionline.pl> (accessed December 20, 2010).

<sup>20</sup> A large list of publishers' bootleg brochures and books is available at <http://atarionline.pl> (accessed December 20, 2010).

<sup>21</sup> Currently computer bazaars only exist in Warsaw. New and used hardware and legal software is offered there cheaper than in retail stores and pirate games are available.

<sup>22</sup> Interview with Lucjan Wencel, Head of cooperation with Eastern Europe at Atari, *Komputer* (August 1986), 11-12. Atari was the only home computer manufacturing company which had a marketing campaign in Poland before 1989. Atari computers were also distributed in Hungary, GDR, and Yugoslavia. Commodore International Ltd officially entered the Polish market in 1991: "Nareszcie w Polsce" (Finally in Poland), *Commodore & Amiga* (February 1992), 2. There is no evidence of any other computer manufacturers interested in the Polish market before 1989; obviously, computer magazines would have welcomed such information.

<sup>23</sup> Interview with Wiesław Migut, Head of Atari computers marketing branch in foreign trade for the company Karen, *Komputer* (August 1986): 12.

<sup>24</sup> *Bajtek* (November 1986): 24.

<sup>25</sup> As proof of the continuing popularity of the platform, an active Polish community of retro Atari XE users exists to this day: <http://atarionline.pl> (accessed December 20, 2010).

<sup>26</sup> Rob Kling, and C. Suzanne Iacono, "Computerization Movements and the Mobilization of Support for Computerization," in *Ecologies of Knowledge. Work and Politics in Science and Technology*, Susan Leigh Star, ed. (Albany: State University of New York Press, 1995), 119-153.

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<sup>27</sup> *Młody Technik* was a very popular Polish magazine on hobby electronics and tinkering, which aimed to promote technical culture – a counterpart of the Soviet *Technika molodiozy*.

<sup>28</sup> *TPI Bulletin* 10 (1982). <http://www.cs.put.poznan.pl/archiwumtpi/> (accessed December 20, 2010).

<sup>29</sup> „Rzecz głęboko matematyczna, rozmowa z Władysławem M. Turskim, prezesem PTI” (About mathematics, Interview with Marian Turski, chairman of PTI), *Życie gospodarcze* (April 4, 1986): 39.

<sup>30</sup> Waldemar Siwiński, “Poza priorytetem,” (Outside the priority) *Bajtek* (March 1989): 2.

<sup>31</sup> Maciej M. Sysło and Anna B. Kwiatkowska, “The Challenging Face of Informatics Education in Poland,” in Roland T. Mittermeir and Maciej M. Sysło, eds., *Informatics Education – Supporting Computational Thinking*, (Berlin and Heidelberg: Springer-Verlag, 2008). 1-18

<sup>32</sup> *Bajtek* (September 1985): 2.

<sup>33</sup> Interview with Marcin Koziół, *Commodore & Amiga Fan* (December 2009): 14. <http://ca-fan.pl> (accessed December 20, 2010).

<sup>34</sup> Interview with Klaudiusz Dybowski, *Commodore & Amiga Fan* (November 2008): 10. <http://ca-fan.pl> (accessed December 20, 2010). Later Dybowski became editor in chief of *Commodore & Amiga*, a popular magazine published from 1992 to 1995. In the 1990s, computer magazines contained a considerable amount of hints for software use, programming tutorials and advice on graphics, music, and DTP, written by hobbyists, not professional journalists.

<sup>35</sup> One ingenious practice of hardware hacking is rigging a joystick from easily available parts of electronic devices and gear levers. Interview with Waldemar Czajkowski by “V-12/Tropyx,” January 12, 2010, [www.riversedge.pl](http://www.riversedge.pl) (accessed December 20, 2010).

<sup>36</sup> *Bajtek* (June 1989): 4.

<sup>37</sup> The last issue of *Bajtek* was published in October 1996. *Komputer* had vanished in 1990.

<sup>38</sup> Computer clubs in schools are not included here. *Kultura w 1993 r.* (Warszawa: Główny Urząd Statystyczny 1994), 188-189. Data for previous years is not available. Given the severe cutbacks in funding cultural centers in the early 1990s, the centers counted in 1993 probably existed before 1989.

<sup>39</sup> Klaudiusz Dybowski and Michał Silski, “Maniak,” *Bajtek* (May-June 1986): 30.

<sup>40</sup> Arti, “C&A Fan – złe dobrego początki,” *Commodore & Amiga Fan* (August 2009): 27.4. <http://ca-fan.pl> (accessed December 20, 2010).

<sup>41</sup> Polish gaming culture in the late 1980s was vividly portrayed in *Retro Gamer*, a popular retro-computing magazine: John Szczepaniak, “With Fire and Sword,” *Retro Gamer* no. 22 (YEAR): 14-15.

<sup>42</sup> See Steven Kent, *The Ultimate History of Video Games: From Pong to Pokemon - The Story Behind the Craze That Touched Our Lives and Changed the World* (New York: Three Rivers Press, 2001); Diane Carr, David Buckingham, Andrew Burn, and Gareth Schott, *Computer games. Text, Narrative and Play* (Cambridge: Polity Press, 2006).

<sup>43</sup> Benedykt Dziubałowski interview with Paweł Zgrzebnicki, May 7, 2009. <http://www.ppa.pl/> (accessed December 20, 2010).

<sup>44</sup> *Komputer* (February 1988): 8.

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<sup>45</sup> Karol Wiśniewski interview with Dariusz Bartoszewski, January 7, 2008, <http://atarionline.pl> (accessed December 20, 2010).

<sup>46</sup> “Kaz” Interview with Michał Brzezicki March 28, 2009, <http://atarionline.pl> (accessed December 20, 2010). The phrase “chodzić na computer” literally meant “going for a computer” and was used to describe visits to gain access to a computer at someone else’s home. “Rąbać” literally means “to chop.” In Polish computer jargon it was a popular term for intensive computer gameplay with joysticks.

<sup>47</sup> The role of users as co-producers of technology was briefly mentioned by Christina Lindsay in “From the Shadows”(2003), 37-40.

<sup>48</sup> Marek Jędrzejewski, “Gdy komputer jest bożkiem” (When a computer becomes an idol), *Argumenty*, (September 27, 1987): 12.

<sup>49</sup> “Kat” interview with Michał Brzezicki, March 28, 2009. <http://atarionline.pl> (accessed December 20, 2010).

<sup>50</sup> V-12/Tropyx” interview with Waldemar Czajkowski, January 12, 2010. [www.riversedge.pl](http://www.riversedge.pl) (accessed December 20, 2010).

<sup>51</sup> There were 1680 responses. *Top Secret* (April-May 1991): 5. Assuming that habits do not change overnight, not even with the transition of 1989, the survey is also relevant for the 1980s.

<sup>52</sup> Krzysztof Ziembik Interview with Maciej Wiewiórski January 10, 2010, <http://atarionline.pl> (accessed December 20, 2010).

<sup>53</sup> Paweł Sołtysiński, “Na dobry początek...,” (To Make a Good Start...) *Kebab* (January 1992): 2.

<sup>54</sup> Frank Veraart, *Vormgevers van persoonlijk computergebruik: de ontwikkeling van computers voor kleingebruikers in Nederland 1970-1990* (Eindhoven, 2008).

<sup>55</sup> Marek Pampuch, “PASSA C64 TRWA (I),” *Horyzonty Techniki* (April 1989). <http://filety.net/> (accessed January 10, 2012). This number could not be compared with the 68,000 members of HCC in 1988, Frank Veraart, “Losing meanings: computer games in Dutch domestic use, 1975-2000,” *IEEE Annals of the History of Computing* 33, no. 1 (2011): 52-65.

“Komoda,” literally “chest of drawers,” was an affectionate name for C-64, a counterpart of the English “Commy.”

<sup>56</sup> *Bajtek* (February 1986): 27.

<sup>57</sup> Frank Veraart, “Basicode: Co-Producing a Microcomputer Esperanto,” *History and Technology* 28 (2008): 129-147, 132.

<sup>58</sup> *Bajtek* regularly published letters from other socialist countries, in which hobbyists praised the magazine, emphasizing its role as source of knowledge for shaping local club activity.

<sup>59</sup> Kristen Haring mentioned similar phenomena among ham radio users, where contacts with remote locations were highly desirable, see: Kristen Haring, *Ham Radio’s Technical Culture* (Cambridge and London: MIT Press, 2007).

<sup>60</sup> Benedykt Dziubałowski interview with Marek Hyla, September 7, 2007. <http://www.ppa.pl/> (accessed December 20, 2010).

<sup>61</sup> For example, Marek Pampuch became editor-in-chief for the Polish edition of German *Amiga Magazin* in 1992.

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<sup>62</sup> Only recently have scholars started researching specific European forms of hacker culture like the “cracking scene” and “the demoscene.” Tamas Polgár, *The Brief History of the Computer Demoscene*, (Berlin: CSW Verlag, 2008). Markku Reunanen, “Computer Demos – What Makes Them Tick?,” licentiate thesis, Helsinki University of Technology, 2009, [www.kameli.net/demoresearch](http://www.kameli.net/demoresearch) (accessed December 20, 2010); Markku Reunanen and Antti Silvast, “Demoscene Platforms: A Case Study on the Adoption of Home Computers,” in John Impagliazzo, Timo Järvi, and Petri Paju, eds., *History of Nordic Computing 2, IFIP Advances in Information and Communication Technology* (Berlin: Springer 2009), 289-301; Antti Silvast, and Markku Reunanen, “Multiple Users, Diverse Users: The Appropriation of the Personal Computer by the Demoscene Hackers,” this volume.

<sup>63</sup> A list of software artifacts from the scene is available on [www.pouet.com](http://www.pouet.com) website (accessed December 20, 2010). At least 700 issues of magazines were published in Poland; most are available at the website [www.filety.net](http://www.filety.net) (accessed December 20, 2010).

<sup>64</sup> Interview with Polonus, *Włócznia Wschodu*, 1990, no. 2, <http://nonane.c64.org/csdb/> (accessed December 20, 2010).

<sup>65</sup> Commodore Scene Database, <http://nonane.c64.org/csdb/> (accessed December 11, 2011). There were similar groups working on ZX Spectrum and Atari, but no detailed sources for those platforms.

<sup>66</sup> Appropriation of computers in Hungary during the 1980s was briefly described in Tamas Polgár, *The Brief History of the Computer Demoscene* (Berlin: CSW Verlag, 2008), 92-95.

<sup>67</sup> It is worth noting other ingenious names of Polish groups like International Cracking Service, Slaves of Keyboard,. and Crazy Boys Software.

<sup>68</sup> TG JSL stands for The Great Jarek Software Limited. Author’s e-mail correspondence with J. H., November 23, 2010.

<sup>69</sup> Maciek Szleminiński, “Polska scena C-64 teraz i kiedyś,” (Polish C-64 Scene: Past and Present) *Commodore & Amiga* (July 1993): 36.

<sup>70</sup> Interview with “Silver Dream,” *Commodore & Amiga Fan* (December 2009): 75. <http://ca-fan.pl/> (accessed December 20, 2010).

<sup>71</sup> Polgár stated that in communist Hungary it was forbidden to send diskettes abroad, but crackers were somehow able to evade this restriction, Polgár, 95. I have not found any such regulation in socialist Poland.

<sup>72</sup> Interview with Polonus, *Inverse* no. 10 (2002), <http://nonane.c64.org/csdb/> (accessed January 10, 2012).

<sup>73</sup> Ibid.

<sup>74</sup> Konstantin Elfimov, “Brief History of Russian Speccy Demoscene and the story of Inward,” (2008), <http://www.mustekala.info/node/921> (accessed December 20, 2010).

<sup>75</sup> Sherry Turkle, *The Second Self: Computers and the Human Spirit*, (Cambridge and London: MIT Press, 2005)