

Frank Veraart – *Vormgevers van Persoonlijk Computergebruik*, (PhD thesis)
Stichting Historie der Techniek, Eindhoven, 2008

Summary – Designers of Personal Computing

In 2008, well into the first decade of the twenty-first century, a computer now seems like a natural and indispensable tool among most communities in the Western world. Hence, the history of the development of computers for small-scale users seems to most to be the story of a natural desire that technology fulfilled in the three last decades of the twentieth century. Deterministic visions of technology, which emphasize miniaturization of electronics, economies of scale, and adoption of technologies back the view of a ‘natural’ need. A closer look into the history of computers, however, shows that invention, development, deployment and use of computers were sites of human agency. Many different actors were involved in this process.

In the field of History of Computing this is acknowledged by a broad array of studies focusing on the inventors and companies involved with the introductions of computers. In most studies there is a bias toward the American producers of hard- and software. This thesis shifts this view. It focuses on the question of how we can understand the adoption of computers in the Netherlands. This move in attention and scope gives insights into the adoption and adaptation processes by users remote from the inventors and producers of the computers. The thesis therefore gives an alternative angle on the adoption of technology centered around intermediary actors and users.

The adoption of computers by small-scale users in the Netherlands is studied in three different domains: at home, at primary and secondary schools, and in small- and medium-sized businesses in the printing industries. Users in these application domains had different financial positions and institutional constraints.

The introduction of computers for small-scale users can be understood as a process in five phases. The development of visions of the future characterized the first phase (1965-1975). In the 1960s spectacular technological achievements such as the space program, military improvements and the growing use of computers in large organizations resulted in optimistic technocratic prospects for computer use in all branches of society. In the turmoil of technological enthusiasm the first visions of personal computing arose. These visions cumulated in the 1970s in accounts in policy reports and the popular press, and resulted in first experiments with personal computing. Most of these were based on technocratic beliefs and on the technology of the time: mainframe computers connected with dead terminals. Personal computing therefore was defined in terms of “computing time” that small-scale users could buy from computing centers.

The second phase (1975-1982) started with the first Dutch experiments in the mid 1970s. Dutch national broadcasting and telephone companies developed experiments with in the first public computer services (viewdata services called Teletekst and Viditel). At different universities education experts started experiments with computers as teaching tool and mathematicians started courses on computer technology. All these views were based on technocratic ideas formulated in the first phase. In these centralized actors controlled the technical layout and input of the computer systems.

As a reaction to the centralized visions, individual computer pioneers (the so-called hobbyists) developed at the same time a social network in which computer technology was opened up for individual use. This network extended itself via shops, clubs,

magazines, and other means of acquiring and exchanging computer hard- and software. These computer pioneers shaped the first use and market for the development of a personal computer industry (mainly in the USA). The computer-as-hobby resulted in various local experiments with personal computers in schools and businesses. On a small scale, hobbyists adjusted hard- and software to their desires in local contexts.

In the third phase a national agenda for computer development was established. An advisory committee to the ministry of Science-policy led by G.W. Rathenau set this agenda in their report on the 'societal aspects of micro-electronics'. This report established the Dutch national policy aimed at a transition into an 'Information Society'. The views and advice of the report found wide acceptance among actors in politics and industry, and served as a blueprint for future developments in personal computing. The actors of phase two (both those with centralized and decentralized views) tailored their activities to this new agenda. This created a patchwork of actors that each in their own way made contributions to the formation of an information society.

This patchwork of independently working actors characterized the fourth phase (1983-1987). The visions inscribed into the national agenda were translated to various contexts of application. A huge number of intermediary actors developed programs to adopt and diffuse computer technology in different contexts. In this phase, intermediary actors worked hard to give meaning to (proper) use of computers. Mediators appropriated different types of personal computers to specific user needs in different contexts. This phase, for example, established the software-copying habits of private computer users as well as their ambivalence to commercial software. Hobbyists made the computer into a game machine. In schools, intermediary actors shaped the computer into a teaching device and in printing industries the computers became a production aid. Intermediary actors helped to shape the expectations of users and the interpretations they gave to the personal computer. The actions of different intermediary actors led to a variety of types of computer and applications for them: The development of software would be crucial in this phase in shaping the new practices of computer use in the different contexts. The fourth phase ended when various initiatives made contact and started influencing each other.

The fifth and last phase can be characterized by a search for standardization by the various intermediary actors. The choice of standards was influenced by widely shared visions about user friendliness and interoperability between computers. In a decision processes by users and intermediary actors various possibilities for computer use were assessed. These processes led either to a power struggle or a co-operation between various intermediary actors. The outcome of this process determined the development of computer technology for small-scale users, and established the lasting influence of the various intermediary actors. Individual use for instance gained major influence over so-called 'private-PC' projects. Here employers supplied employees with PC's. The initially important intermediary actors such as hobby clubs lost control and the agenda for personal computers was shifted to interoperability with office equipment. In education the ministry created homogeneity in the computer types and use by a major sponsoring program in which all primary and secondary schools received IBM compatible PC's provided with Microsoft Windows. This configuration was the result of a ministerial compromise between the visions of teaching experts, educational managers and business sponsors. In the printing industries, the introduction of Apple Macintosh computers in combination with Desk Top Publishing (DTP) profited from suppliers' courses and

adaptations of the software to work practices. The introduction was given an extra impulse by support from the printing industries' professional organizations and entering of courses in educational programs on printing.

The developments in personal computing can be understood by analyzing the functions of intermediary actors and the means they deployed to influence the users' assessment process. The mediation process developed along with computer use. The first intermediary actors either originated from user groups or developed from other mediators that took on computer use. Different intermediary actors had varying scopes of functions that bridged the gap between suppliers and users. Intermediary actors can be divided into incidental and intentional mediators. The first mediate on an ad hoc base, the latter have mediation as an explicit purpose. Based on the case studies, incidental mediators seem to be involved in the initial stages of the mediation. The intentional mediators build on these initiatives and develop elaborate means and activities of mediation.

Observed from a users' perspective, intermediary actors work on two levels. The first level is direct mediation, in which mediators are actively involved in the mediation of technology between suppliers and users. Examples of these are specific courses and customer support in the introduction of computers in schools and businesses. The second level is indirect mediation, which comprises the vast amount of non-specific information that is transferred to users by ads, magazine articles and demonstrations at fairs. The differences in function and level of mediation show that the introduction of computers is not a single process between producers, mediators and users. Rather users consult and assess different intermediaries in search for sufficient and reliable information.

The speed of adoption of computers by small-scale users varied in the different fields of application. The adoption of personal computers in Dutch households started in the late 1970s and grew gradually to 60% by the turn of the century. The adoption of computers in primary schools speeded up in the mid 1980s. It had a much quicker pace and resulted into a 100% adoption in 1994. In the printing industries the adoption of personal computers in DTP kicked off in 1987. In five years nearly half of these industries had adopted these technologies.

The differences in adoption rate between the different fields of application can be explained by the autonomy of users and the ambitions that users and actors had for computers in the different contexts. The individual computer users were the most autonomous. They could choose freely from computer technologies and their uses. They combined this freedom, however, with the least ambition, compared to the other fields of application. New activities and applications developed gradually without deadlines.

The individual users sharply contrasted with the users at primary and secondary schools. The highest ambitions for the use of computers were set in education. The computer there was to be used as a learning aid and by the early 1980s, in anticipation of an 'information society', pupils also needed to learn the societal and practical aspects of computers to avoid computer illiteracy. Many intermediary actors took up this task in even more initiatives. This resulted in a patchwork of computer types used in many different applications. The Dutch ministry regained control through a major sponsoring program in which all Dutch primary and secondary schools received computers of one single type selected by the ministry. The selection of this computer was made in consultation with experts and many intermediary actors. The influence of this strong actor led to a swift and complete adoption of computers in Dutch schools.

The users in the printing industries held a middle position between the individual users and the schools. Similar to the individual users, they had a great autonomy. Within the constraints of business economics they could choose freely. Application and ambitions were however far clearer. Personal computers combined with DTP were initially seen as strategic innovations. This changed in the late 1980s, when they became a production necessity. This transformation was the result of intermediaries such as suppliers that improved, adapted and explained the technologies to the printing industries. They also shaped the environment (designers, photographers) of the printing industries in the use of DTP. This process took four to five years. Around 1987 the professional organizations started supporting DTP. After this move, a rapid adoption of DTP in the printing industries followed.

The case studies in this thesis show that the introduction of computers did not evolve naturally. Many actors were involved: producers, users and intermediary actors. The latter explained and adapted the technologies to specific fields of application. This interplay between producers and users was vital for the adoption of computer technologies. The development and adoption of personal computer use can therefore only be understood by including the activities of the mediators and users.