THE DIGITAL DIVIDE
AS A COMPLEX AND DYNAMIC PHENOMENON

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1. The multifaceted concept of access

Presently, hot discussions are going on in America and Europe, in particular, about the question whether there is a so-called 'digital divide' or not. And when it is deemed to exist, the next question becomes whether it will close or widen in years to come. Most of this discussion has a heavy political load. Old views reappear about markets and people solving all problems by themselves, or not, and about the need or rejection of government interference. In this paper we will try to postpone this ideological discussion in order to first develop scientific conceptual distinctions and to present reliable and valid empirical data of longitudinal research on this subject matter. The concepts of 'digital divide', 'access', 'adoption of innovations following S-curves' etc. will be carefully explicated. The most reliable and valid data from the USA and European countries will be summarized. Finally, some results of a large-scale official social survey in the Netherlands will be presented as it is one of the few that tried to go beyond the usual demographic background variables elaborating multiple regression models for the explanation of differences found in these background variables.

The first obstacle in all research and discussion on information inequality is the multifaceted concept of access. It is used freely in everyday meanings with a lack of notice that it is used in very different meanings. The meaning of having a computer and a network connection is the most common one in the context of digital technology. However, according to Van Dijk (1999) this only refers to the second of four successive kinds of access, called 'hurdles' or 'barriers' on the way to the information and network society. Van Dijk distinguishes four kinds of access:

1) *Lack of any digital experience* caused by lack of interest, computer fear and unattractiveness of the new technology ('psychological access');
2) *No possession of computers and network connections* ('material access');
3) Lack of *digital skills* caused by insufficient user-friendliness and inadequate education or social support ('skills access');
4) Lack of significant *usage opportunities* ('usage access').

Clearly, public opinion and public policy are strongly pre-occupied with the second kind of access. Many people think the problem of information inequality

regarding digital technology is solved as soon as everyone has a computer and a connection to the Internet. The first kind of access problem, the mental barrier, is neglected or viewed as a temporary phenomenon only touching old people, some categories of housewives, illiterates, and unemployed. The problem of inadequate digital skills is reduced to the skills of operation, managing hardware and software. Sometimes this is also viewed as a temporary phenomenon to be solved shortly after the purchase of a computer and a network connection. Differential usage of computers and network connections also is a neglected phenomenon. Usually it is not seen as being of any importance to social and educational policies as differential usage is presumed to be the free choice of citizens and consumers in a differentiating post-modern society. So, there is a strong material or 'hardware orientation' approaching access to digital technology.

According to Van Dijk access problems of digital technology gradually shift from the first two kinds of access to the last two kinds. When the problems of mental and material access have been solved, wholly or partly, the problems of structurally different skills and uses come to the fore. He defines digital skills not only as the skill to operate computers and network connections, but also as the skill to search, select and process information from a superabundance of sources. He expects the appearance of a *usage gap* between parts of the population systematically using and benefiting from advanced digital technology and the more difficult applications and services, and other parts only using basic digital technologies for simple applications with a relatively large part of entertainment. Van Dijk stresses that computers are more multifunctional than any medium before.

This position is elaborated in this paper making further conceptual distinctions and presenting the latest data presumed to be reliable and valid. We will show that the so-called digital divide actually is a very complex and dynamic phenomenon. It is not easy to derive the most important tendencies and policy directions. Yet, we will attempt to do this and suggest options for further research.

2. Some facts: a digital divide in the USA and Europe?

Unfortunately, most survey data about computer and Internet penetration or use are too unreliable and unvalid to draw definite conclusions about the existence and development of digital divides. Internet statistics even are notoriously unreliable for reasons of defective sampling, the non-response and bad quality of much (marketing) telephone interviewing and the novelty of affairs to be observed. What we need are large surveys with sufficient representativeness or census material and other official statistics. Further, to make statements and test hypotheses about trends in computer or Internet penetration and use longitudinal data or time series are required. These are rather rare, but they are starting to appear now. From 1994 until 1999 we could use the bi-annual GVU-surveys among Internet users (GVU Centre, Georgia University, 1994-1999). Time series could be constructed from their data. However, the problem was that they were based on non-random, that is (self)selective sampling.

Census material and other official statistics are beginning to appear in the USA and Europe. The trends of the eighties and nineties, with 1997 and 1998 as the last years of measurement, can be derived from them. Preferably we will base our conclusions on these data: the US Censusbureau data 1984, 1989, 1993, 1997, the partly overlapping NTIA data about telephone and computer penetration 1994 and 1997, the annual Eurobarometer (European Union) and Dutch official statistics (by the SCP) of 1985, 1990, 1995 and 1998.

Presenting the data about 'digital (in)equality' and the (non)existence of a 'digital divide' from these sources we will make a sharp distinction between the four kinds of access distinguished.

1. Elementary digital experience

Few data are available – particularly in official statistics- concerning the first experiences of potential users of digital technology. Mental barriers of access are severely neglected in the discussion about the 'digital divide'. It is known that large parts of (even) the developed countries marked by high technology still have no or very few digital experience. Measuring the resulting digital skills (operating digital media and searching for information in these media) one finds even in one of the most digitised countries of Europe, the Netherlands, 36 per cent of the 1998 population with no or very few digital skills. Among people 65 and older this figure reaches 67 and among people with low education 69 per cent. The average of women with no skills is 45 per cent and among people with low middle education it is 49 per cent. See Table 1 below.

	NO OR VERY FEW SKILLS Score 1,0 – 2,0	REASONABLE SKILLS Score 2,1 – 3,5	GOOD SKILLS Score 3,6 – 5,0
ALL	**36**	**52**	**12**
AGE			
18-34 years	**27**	**56**	**17**
35-49 years	**37**	**54**	**9**
50-64 years	**48**	**46**	**6**
65 +	**67**	**31**	**2**
GENDER			
Male	**28**	**55**	**17**
Female	**45**	**49**	**6**
EDUCATION			
Low education	**69**	**25**	**6**
Low middle	**49**	**46**	**5**
High middle	**30**	**58**	**12**
High education	**27**	**55**	**18**

Score on 10 applications: Windows, word processing in DOS and Windows, spreadsheets, drawing/graphics, working with key boards, Internet, programming, e-mail and statistical programmes

Table 1
Skills in the Use of PC programmes Netherlands, 1998 , Source SCP ,2000

In a Dutch survey for digital skills two years before subjective and emotional factors appeared to be responsible for this lack of skills to a large degree (Doets

and Huisman, 1997. An experience of personal shortcoming (leading to insecurity), the idea of being excluded and negative attitudes towards this technology give rise to 'computer fear' or even 'button fear'. Mental access problems come forwards when it is claimed that there are not only information have-nots', but also information *want*-nots'. In 1999 a couple of European surveys were published revealing that about half of the population not connected to the Internet also did not want such a connection. One of these surveys was the German Online Non-users Survey (ARD / ZDF, 1999). Among the 501 non-users in this representative sample for Germany 234 (54 per cent) declared they certainly would not connect to the Internet for a mixture of reasons presented in Figure 1.

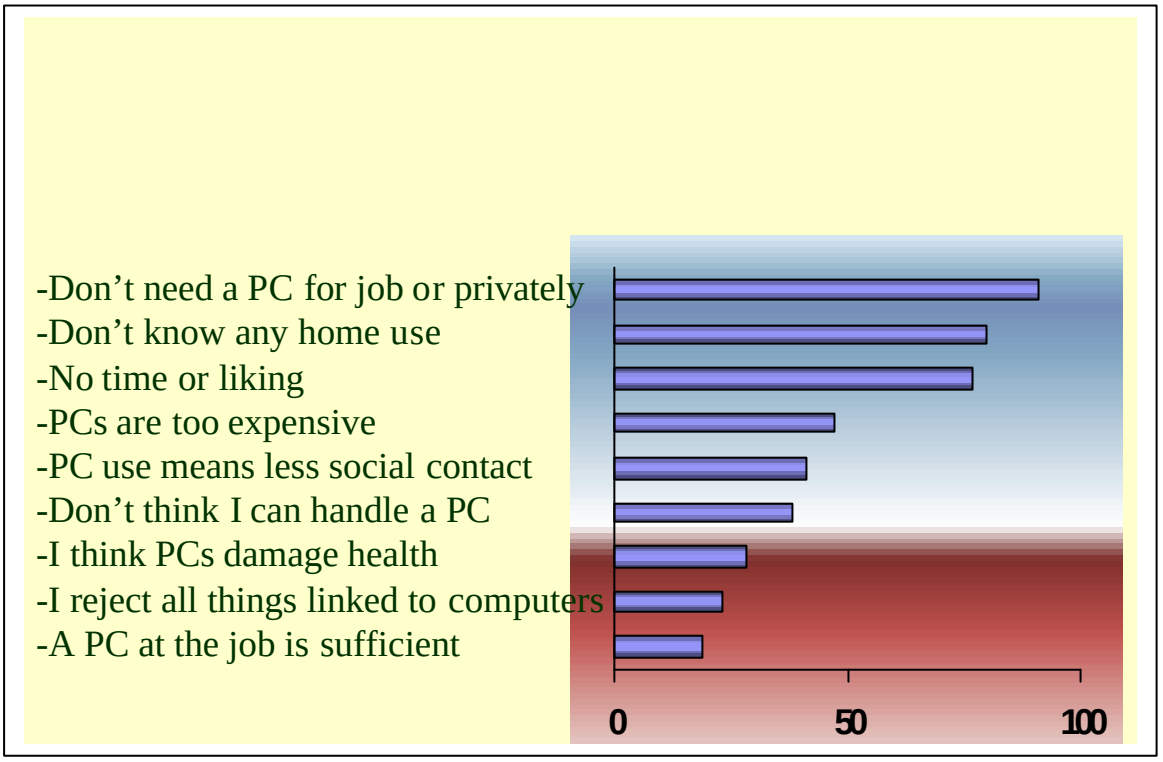


Figure 1 Offliners reasons for not buying a PC in Germany, 1999, Source: ARD/ZDF Online Not-users Survey, 1999

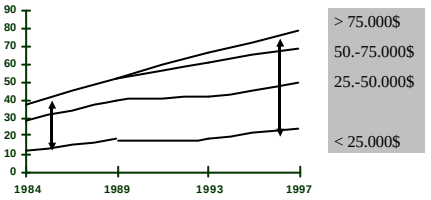
The reasons presented in this Figure reveal everyday motivations like: I don't need it, I don't like it, I can't buy it and I can't handle it. It appears to be possible to live and work without digital technology. Presumably, there is some 'gap of motivation' among the populations of (even) high-tech countries. People with old age, low education, a large proportion of women and (functional) illiterates are strongly over-represented at the one side of it. Further research for the ingredients of the mixture of reasons observed here is urgently needed.

2. Possession of computers and network connections

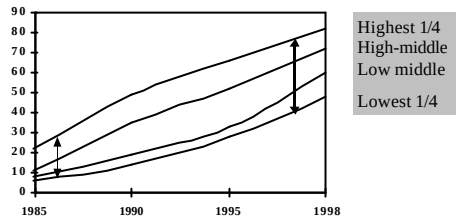
Current discussions about 'digital divides' are completely dominated by the (lack of) availability of the hardware to everyone. Here we have an abundance of data. Increasingly, longitudinal data in official statistics are supplied. They do reveal

strong evidence of digital divides in the possession of computer and network connections among a number of social categories during the 1980s and 1990s: income, education, occupation, age, gender, race and geographic location. Constructing time series from these data it can be shown that most of these gaps of possession have *increased* during the 1980s and 1990s. Below one will find a collection of figures showing this for the variables of income, employment, education and age in both the US (see US Cencus Bureau 1984, 1989, 1993, 1997 and Kominski and Newburger, 1999) and the Netherlands (see SCP,2000). Race is added as a category in the US. Gender is not included, as in both official statistics households were the unit of data collection. Gender differences related to possession of equipment are not sufficiently articulated in this type of research. They did come forwards in the biannual GVU-surveys among individual web-users (GVU-Center, 1994-1999). Here it appeared that the original gender gap in actually using PCs and the Internet *decreased* during the 1990s.

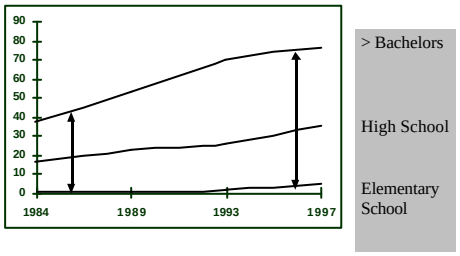
GAP OF INCOME USA 84-97
USE OF COMPUTERS AT HOME, WORK, SCHOOL



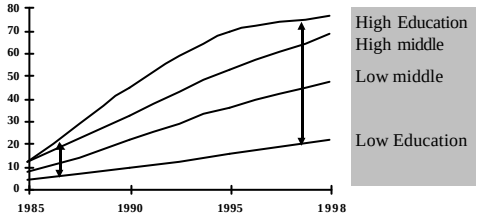
GAP OF INCOME NETHERLANDS 85-98
HOUSEHOLD POSSESSION OF COMPUTERS



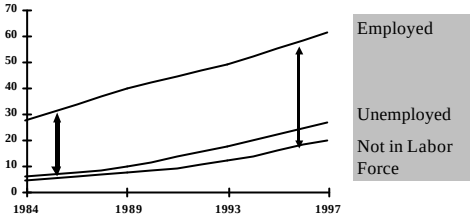
GAP OF EDUCATION USA 84-97:
USE OF COMPUTERS AT HOME, SCHOOL,WORK



GAP OF EDUCATION NETHERLANDS 85-98
HOUSEHOLD POSSESSION OF COMPUTERS



GAP OF EMPLOYMENT USA 84-97) USE OF COMPUTERS AT HOME, WORK, SCHOOL



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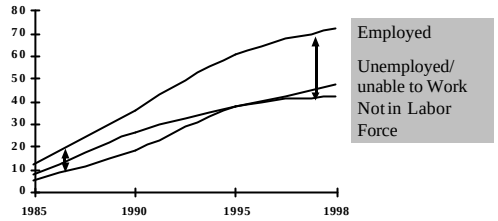
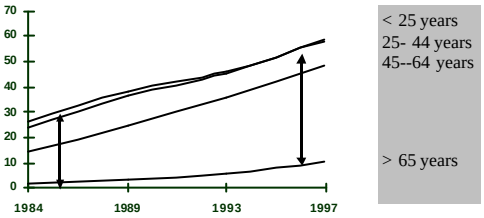
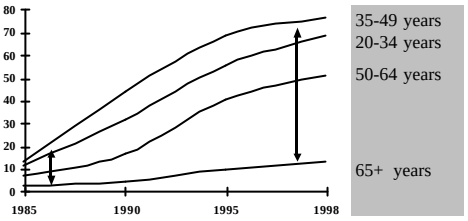


GAP OF AGE USA 84-97 USE OF COMPUTERS AT HOME, WORK, SCHOOL



GAP OF AGE NETHERLANDS 85-98 HOUSEHOLD POSSESSION OF COMPUTERS



GAP OF RACE USA 84-97: USE OF COMPUTERS AT HOME, SCHOOL AND WORK

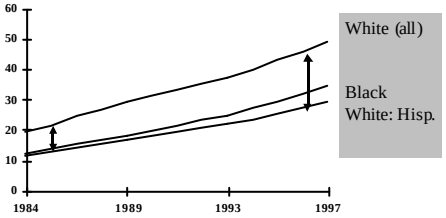


Figure 2a-2i Gaps of Income, Education, Employment, Age and Race, USA 1984-1997, Source US Census Bureau, 1984, 1989, 1993, 1997;
Gaps of Income, Education, Employment and Age, The Netherlands 1985-1998, Source: SCP, 2000

The big question connected to the observation of these widening gaps is whether this trend will go on like this. From statistical (population) reasoning it is evident that it will not. *Saturation* of computer and network possession among the 'higher' categories will set in, and presumably has started already in countries like the US and the Netherlands. For the 'lower' categories there is much more room to catch up. So the actual question becomes how much gaps will close in the first two decades of the 21th century, and what is more important, what *kind of* computers and network connections people will possess. We will come back to this crucial issue in the next sections.
Another big question deals with the most important factor or variable among the complex of background variables. Evidently, income, education and employment are strongly associated. Holding the other factors constant it can be shown in the American and Dutch statistics that they keep an independent effect. The Dutch SCP-study, however, made elaborate multiple regression analyses for the weight of the most important variables in both the possession, skills and use of ICT. The results are extremely interesting.

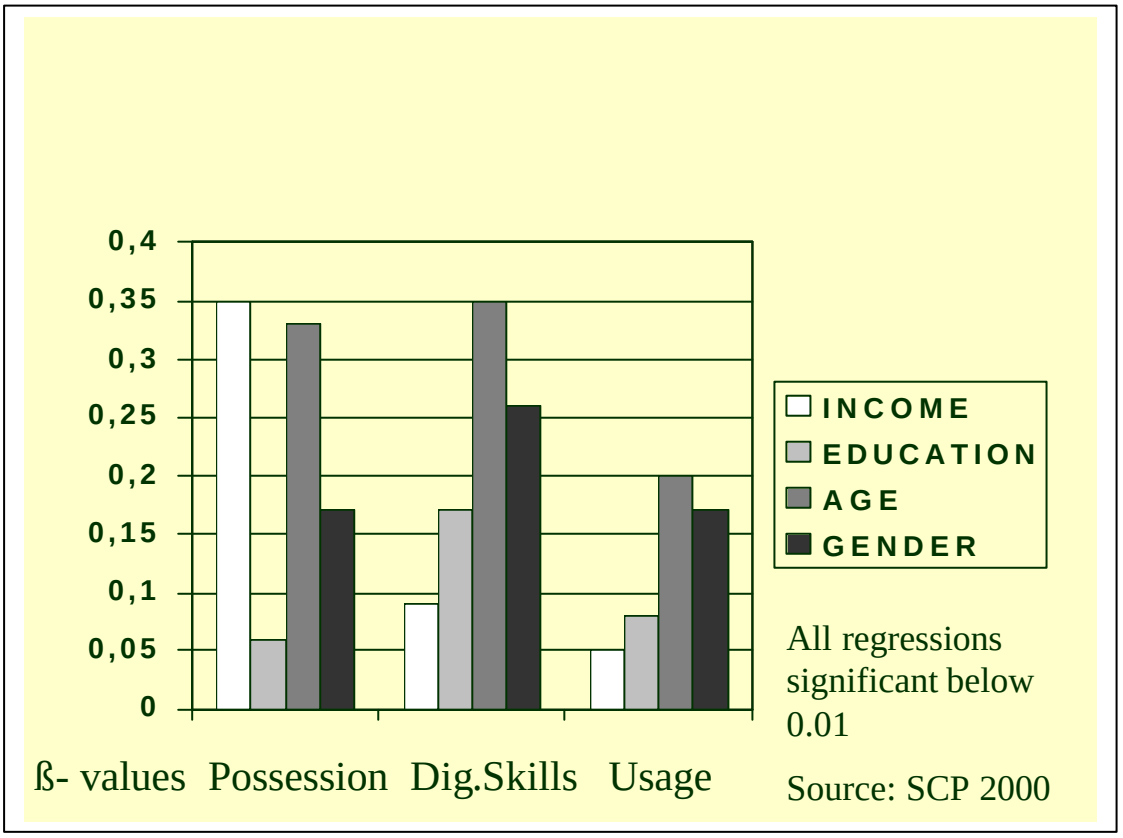


Figure 3: Possession, Skills and Use of ITC in Holland:
Multiple regression of demographic variables

The most important conclusion from the 1998 Dutch SCP study is that household income is the most important factor explaining differences in the possession of ICTs, first of all PCs, and that this factor shifts to the background in the explanation of differences in digital skills and ICT usage. Surprisingly high,

perhaps, is the relative weight of age and gender. As for age the distribution is curved: first possession increases with age (with a top in the class of 30-40) than it decreases. Women have significantly lower possession, skills and use of ICTs. We will try to explain why the possession of ICT is not only a matter of material resources but also of the attractiveness of this technology and the necessary skills to use it among people of different age and gender.

2. Digital skills

PCs and computer networks were renowned for their user-unfriendliness until well into the 1990s. Major improvements were made with the introduction of graphical and audiovisual interfaces. However, the situation is still far from satisfactory if we look once again at Figure 1 above presenting differences of digital skills among social categories in the Netherlands. Gaps of digital skills can be shown to exist. In the study concerned digital skills were operationalized using an index called 'informacy' measuring both skills of operating digital equipment and skills of searching information in operation. The other Figure with the multiple regression analyses reveals the (perhaps) surprising result that digital skills are not primarily related to educational levels but to age and gender. Probably, this means that real practice and motivation are more important in acquiring digital skills than formal education. Indeed, many studies reveal that having computer experience at work, having particular hobbies and having a family with schoolchildren are decisive factors in the acquisition of digital skills by adult people.

3. Different uses

In this paper and on other occasions (Van Dijk, 1997,1999,2000) it is predicted that ultimately different uses of ICT will bring the most important digital and information inequalities in society. Presently, the differences observed in this kind of access are not as big as those in differential possession and skill (see for instance Figure 1). However, one needs a dynamic conception of information inequality in the information and network society to explain the underlying trends in this society, as will be argued below.

Unfortunately, data about differential usage are still scarce and only a few years old. They are available for computer use and Internet use, both in the US Census material and the Dutch SCP investigation. However, it is our view that only computer use has had some time to crystallize; Internet use is only appearing as a mass phenomenon at the turn of the century. We have to wait for longitudinal data to construct the time series we need for testing our prediction: the rise of a usage gap. Here is the state of affairs concerning computer use in Holland and the US, in 1998 and 1997 respectively.

	Word Processing	Games	E-mail	Internet	Book-keeping	Work at Home	Spread-sheets	Data-bases
Total using PC at home	70.5	53.6	44.5	44.2	43.6	34.3	28.7	26.1
AGE								
18-24 years	69.7	61.4	42.8	44.3	19.5	14.0	18.7	17.1
25-49 years	70.3	55.0	45.8	45.9	46.9	38.5	30.9	27.3
50 years +	71.4	44.7	41.4	39.3	48.6	34.4	28.3	28.1
GENDER								
Male	66.3	57.6	48.1	49.4	46.3	38.0	32.5	29.4
Female	74.7	49.6	40.7	38.9	40.8	30.6	24.7	22.7
FAMILY INCOME								
< $ 25.000	69.1	57.2	40.6	38.9	35.5	22.7	22.3	20.9
$ 25-49,900	66.2	58.4	39.7	39.8	43.7	29.2	25.3	23.9
$ 50-74,900	71.2	55.4	44.9	45.1	43.9	35.5	29.7	26.7
> $ 75.000	75.8	47.6	52.1	52.3	47.3	44.8	34.7	31.1

Table 2: Usage of PC at home, USA 1997 (Source US Census Bureau)

	Word Process-ing	**Games**	**CD- Phone and Travel Guide**	**Spreadsheet /Database**	**Graphics/ Drawing**	**Internet**	**E-mail**
Total using PC at home	**86**	**59**	**46**	**45**	**37**	**37**	**34**
AGE							
18-34 years	**89**	**74**	**45**	**46**	**41**	**38**	**36**
35-49 years	**84**	**54**	**47**	**44**	**35**	**39**	**35**
50-64 years	**83**	**36**	**45**	**42**	**35**	**35**	**31**
65 +	**79**	**31**	**41**	**46**	**16**	**35**	**20**
GENDER							
Male	**89**	**58**	**55**	**60**	**45**	**44**	**42**
Female	**81**	**60**	**32**	**36**	**26**	**27**	**25**
FAMILY INCOME							
1th Quarter	**90**	**74**	**42**	**43**	**42**	**33**	**30**
2th Quarter	**82**	**62**	**47**	**40**	**36**	**31**	**28**
3th Quarter	**85**	**57**	**45**	**39**	**36**	**37**	**35**
4th Quarter	**87**	**46**	**52**	**59**	**34**	**49**	**46**
EDUCATION							
Low education	**73**	**78**	**47**	**16**	**32**	**16**	**12**
Low middle	**72**	**66**	**42**	**32**	**38**	**32**	**29**
High middle	**88**	**64**	**43**	**45**	**36**	**35**	**32**
High education	**95**	**46**	**50**	**56**	**37**	**46**	**44**

Table 3: General usage of PCs, Netherlands 1998 (Source SCP)

Here we can see substantial differences in the use of PC applications, especially among people with different age, gender and education. With age fairly large differences appear in using games, spreadsheets / databases / bookkeeping (USA) and drawing and e-mail use in the Netherlands. With gender we see that females use all applications significantly less than males. Levels of education appear to correlate with a different use of games, spreadsheets / databases, Internet and e-mail (Netherlands). In the USA only the data of income levels are available revealing differences in e-mail and Internet use and other more advanced applications: bookkeeping, spreadsheets, databases and work at home.

3. Interpretations

As it was noticed before the interpretation of the data indicating a digital divide or not has become a heavily contested political issue. Statistics are freely selected and judged according to ones own interest and political will. Social and political opinion has developed four kinds of positions with interpretations of the state of affairs:

1) Denial of the existence of a digital divide;
2) Acceptance of some present divide(s), claiming that they will soon disappear;
3) Emphasis of digital divides which are supposed to grow and come on top of old inequalities of income, education, age, gender, race and geographical location;
4) Differentiation: some divides are decreasing while others grow.

We will shortly describe these positions and comment on them from our own interpretation coming close to the last-called position and to be backed by scientific explanation in the next section.

A number of market research institutions, other corporate interests and conservative think-tanks deny or trivialize the existence of digital divides. Basically, their arguments are threefold (see a.o. United States Internet Council, 1999, based on Forrester research, and Thierer, 1999):

1) The adoption rate of computers and the Internet and the growth rates of their use are faster than any medium before, perhaps with the exception of (color) TV.
2) The distribution among the population approaches normality: the averages of income, education, race, gender etc. rapidly parallel society as a whole.
3) Computers and Internet connections are becoming cheaper by the day, cheaper than a color TV-system adopted by almost every Western household. The market is doing its work and solves all problems.

Indeed, growth rates are enormous. However, there are some basic problems with the S-curve of adoption of innovations that usually is the base of this argument, problems to be dealt below.[1] One of them is the demarcation problem of the media supposed to be entering a S-curve: a computer and an Internet connection now is very different from a computer and Internet connection 10 years ago. They are both easier to use on average and offering diverging simple and advanced types of hardware, software and usage opportunities.
It goes without saying that a medium spreading into society is approaching average parts of the population. However, digital divides are about *relative* differences between categories of people. In the 1980s and 1990 most of these divides concerning possession of computers and Internet connections have increased as has been convincingly demonstrated by the American and Dutch official statistics supplied above. One is free to predict that these divides will close rapidly, an argument to be dealt with below, but their existence in the present and recent past can't be denied. The argument about cheaper hardware is right, but only partly so. It forgets many things like: 1. These media come on top of older mass media that do not disappear: one still needs a TV, radio, VCR, telephone and perhaps a newspaper; low income households continually have to weigh every new purchase (with the newspaper beginning to loose). 2. Computers are outdated much faster than any other medium and continually new peripheral equipment and software has to be purchased. 3. 'Free' Internet access or computer hardware is not really free, of course. There are nominal monthly fees, long-term service agreements, privacy selling and low-quality service, for instance.
However, the most important problem of this position, and the next one, is the hardware orientation in it. Perhaps the most common social and political opinion is that the digital divide problem is solved as soon as every citizen or inhabitant has a computer and an Internet connection. Alas, to our opinion than it just starts, to put it a bit thick.
The second interpretation might accept that there are, or have been divides but that they will soon disappear, perhaps to be succeeded by other inequalities. It is simply a question of some having the technology now and others having it later. The first pay for the innovation and make later adoption cheaper for the last. There is a strong faith in the trend of the S-curve of adoption and in the extension of access by market forces alone. This interpretation comes from the authors of the Dutch SCP-Survey, among others. From a statistical point of view their position will be backed by future data automatically. The saturation of possession by the 'higher' social categories sets in, and has already started in

[1] The S-curve of the adoption of innovations presupposes that the medium in question is easy to identify and to mark from others. This might be true for older mass media like a radio, a TV or a VCR but not for computers and network connections. They fall apart in extremely different types strongly complicating the construction of any valid time series of adoption. The second questionable proposition is the maximum population of potential adoption. The classical S-curve presupposes whole populations. However, some new computer and network media are too advanced, complicated and expensive to be ever adopted by 100 percent of the population.

some Western countries as one can see in the slope of the top-curves in the time series of the last section. So, the position seems to be dynamic taking the future trend into account. In fact it is very static. It reasons from present technologies and their uses. The questions are what relative differences will remain in 10-20 years and what kind of 'computers' and 'Internet' will be possessed. How will they be used? What skills will be needed? One has to remember that a comparable innovation, telephony, took 70 years to acquire an (almost) general distribution and that penetration rates are still not complete and use is very unequal, even in the rich developed countries.

Another argument of the disappearing divides position is that there is no divide in the sense of a structural gap or a two-tiered society: the differences are of a gradual nature (see SCP, 2000). This qualification has some right: the two-tiered position is too simple; in fact we see the stretching of a whole spectrum of differentiating positions in (post)modern society, not two classes of people (van Dijk, 1997, 2000). From a substantial point of view this qualification might also be right concerning the *basic possession* of computers and Internet connections, though the SCP surveys own conclusion is that household income is the most important factor explaining it! Anyway, we are not so sure that structural divides won't persist and increase concerning digital *skills and usage*, the core of our argument.

The disappearing divide position is often politically motivated by the wish to prevent government interference. One supposes markets will solve most problems by themselves lowering prices and offering more choice to everybody and that people in their communities and organizations will solve the rest of problems in self-regulation. We don't want to engage in this full-political discussion here – see section 5- ; we just want to notice the fact that almost every government in the twentieth century has adopted policies to promote important mass media for communication in society, including tax policies and hardware and support subsidies for all kinds of public services, and that every government has implemented educational and cultural policies.

A third set of interpretations does emphasize the persistence and growth of a digital divide or digital divides. It is supported by left-wing political forces, social-democrats, socialists, progressive NGO's etc. They stress the rise of social and economic inequality in Western society and on a word-scale in general during the last two decades. They claim information inequality only adds another layer to increasing old inequalities of income, education, occupation or social class, race and gender (see a.o. Schiller, 1996). They hold that the claim of cheaper ICT products is a corporate trick. After the supply of hardware access the selling of expensive service and content starts. There may be large parts of truth in this interpretation: general inequality has increased both nationally and internationally (see United Nations Human Development Reports of 1998 and 1999)- and old inequalities do not disappear with the advent of an information or knowledge society. However, this position underestimates the import and complexity of changes taking place. Increasing differences in the skill and usage of the new information technologies might lead to new inequalities of a nature not known before and to be contested, if one chooses to do so, with other means

than the traditional ones. And, what's more, cheaper hardware with more capacity and free Internet access as a public service are very real and important phenomena. The new technologies offer new opportunities for citizen participation and the consumer interest.
The last set of interpretations stresses current differentiation in society in general and the use of ICT in particular. The information society or the network society shed another light on social inequality (see Castells, 1996, 1997, 1998 and Van Dijk (1991, 2000). Others even claim that the information or knowledge society will discard old inequalities and bring completely new ones based on differential knowledge and education. We don't think so; we think there is also continuity. The next section will elaborate this statement. Concerning the digital divides discussed here these interpretations stress that some current divides or gaps may (partly) disappear, while others stay or increase. Indeed, our own position is that current digital divisions are extremely complex and dynamic phenomena. Complex in the sense that, for example, access is a multifaceted concept with all kinds of different problematics, and dynamic in the meaning of trends based on evolving technology and its uses.

4. Scientific explanations

The differences of possession, skill and use of ICTs usually lack scientific explanation. Even multivariate analyses trying to weigh determining factors are rare. An exception is made by the Dutch SCP-Survey constructing regression models to explain these differences by unequal possession of resources by individuals or households. This is a classical sociological approach in empirical research. Three kinds of resources were distinguished: material, social and cognitive resources. In this survey material resources appeared to explain more (in the regression models) than income does. The variable constructed is composed by questions about the possession of all kinds of *equipment* in households. Social resources are operationalized in a number of questions about 1) having a social *network* also possessing and using digital technology and 2) having social *support* in managing it. Cognitive resources are threefold: *literacy, numeracy and informacy*. Literacy is the skill of reading and of searching information in texts. Numeracy is the ability to handle numbers, figures and tables and to compute. Informacy is equal to digital skills in this survey. It is operationalized in two ways: operating digital equipment and searching for information in digital sources. The cognitive resources taken together appear to explain more than the variable of education.
The results of the regression model based on these resources are very interesting. Striking differences of the importance of these resources are found at the possession, skill and use of ICTs respectively.

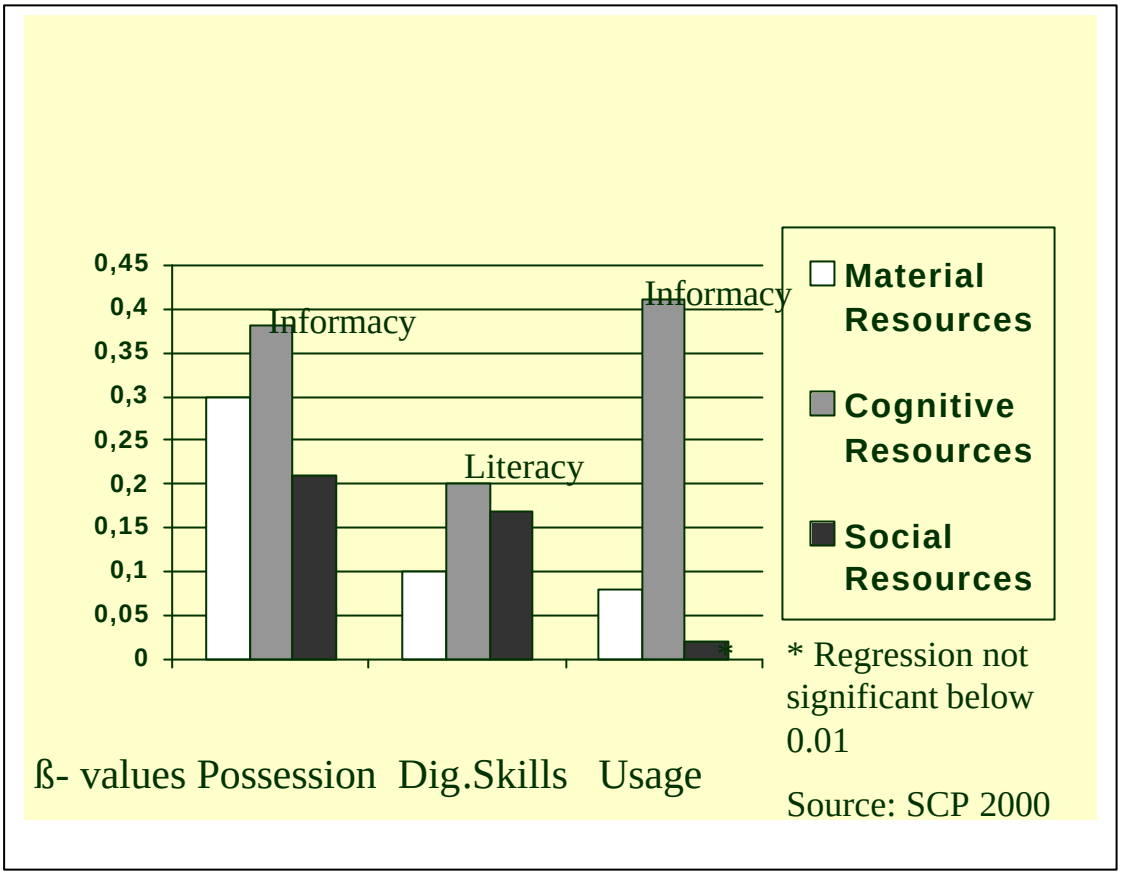


Figure 4: Possession, Skills and Use of ITC in Holland: Multiple regression of Background variables

Possession of ICTs is explained more by informacy (digital skills) than by material resources. Skills are explained by literacy and social resources (having a social network and support). A remarkable result is literacy being far more important for the explanation of digital skills than numeracy. Apparently, people with the ability to process textual information are more likely to develop digital skills than people that are good in numbers and computing. Clearly, these days computers are no longer number crunching machines.
Usage is overwhelmingly determined by informacy or digital skills.
The general conclusion of the SCP research team is that differences of skill and use are smaller than differences of possession. After the threshold of having a computer and network connection has been passed material and social resources play a relatively minor role. Social-cultural differences of age, gender, literacy and informacy come forwards. Present differences and even divides are observed – see figures and tables above- but according to the SCP team they are old inequalities reproduced, no new inequalities that often are related to a knowledge or information society. The team claims that there is no unbridgeable digital divide and government intervention is not needed.

To our opinion these far-reaching political conclusions are drawn too fast. They are based on a rather static and superficial sociological analysis of the present situation. Constructing rather arbitrary background variables of *individual* resources at a single point in time does not make a theory that is able to relate to social and technological development, that is to say, the level of *society and*

technology. Technology is changing fast: very advanced and very simple applications are appearing side by side. And according to many scientists and other observers society is changing into an information society and a network society were social (in)equality will partly be different from old modern societies.

In an information society information is a so-called primary good. Everybody needs it to function in society. However, people also need cultural capital (Bourdieu) to use it in an appropriate way: that is the skill to select and process information. This capital is distributed very unequally in society. Moreover, information is a positional good. This means that it becomes ever more important to get the information first in economic, social and cultural competition. This is why it is so important to look at the *relative* differences in any possible gap.

The importance of cultural capital for the ability to extract relevant information from innumerable sources is even stronger in the network society, a typification in the line of the information society. A network society consists of social and media networks shaping the prime mode of organization and most important structures of modern society (van Dijk, 1999). Here the position inside and outside networks becomes vital. This position defines ones opportunities and power in society. Staying outside networks means total exclusion. Being inside might mean partial exclusion when the position occupied is a marginal one. The position acquired at work, at school, at home and in the local community also determines the chances to acquire elementary digital experience, to develop digital experience and to use particular applications. Here it is insufficient to observe only whether one is employed or not and how big ones household is. The precise positions at the job (occupation, function, task), at school, in the family and the community have to be recorded and related to the possession, skill and use of ICTs. Unfortunately these data are scarce. We have seen that measuring skills and usage is a fairly recent research activity, particularly in relationship to the Internet. So we are not able to look for such clear 'gap pictures' as they are available on the field of the possession of computers and network connections. The evidence is only fragmentary, like the tables of usage we supplied above, or too fresh to make time series, like the 1993 and 1997 US Census Bureau statistics of the precise occupations and industries using particular applications of ICT (see US Bureau of the Census, 1993, 1997).

Further research for skills and usage is urgently required. This will put us in the position to investigate whether more or less structural inequalities in skills and usage appear between social classes and people of different age, gender, race and geographical location. This is the hypothesis of simple versus advanced, businesslike versus entertainment applications adopted relatively more by particular classes of people, a suggestion made in section 2 and elaborated in Van Dijk (1999, 2000).

Individual differences of ICT possession, skill and use observed should not only be related to the general environment of the information or network society, but also to the particular social trends of a particular epoch. Van Dijk (1999, p. 153-4) has argued that in the present epoch several trends come together to promote information inequality: social and cultural differentiation or individualization, rising income differentials, privatization and cutbacks in social and public

services and, finally, increasingly multifunctional and differently used digital technology. The last trend supports his vision of the new media as *trend amplifyers*: equalities and inequalities already present, growing or declining in society will be reinforced by this technology.

5. Conclusions and Policy Perspectives

Following the line of the argument in this paper the complexity of the picture of the so-called digital divide comes to our mind. A number of significant divides have been observed and supported by relatively reliable official statistics and surveys. However, there is no question of an *absolute*, yawning and unbridgeable gap between two classes of people. Talk about 'technological segregation' (NAACP President Kweisi Mfume) and 'classical apartheid' (Reverend Jesse Jackson) is exaggerated and misses the point. The point is that the gaps observed show first of all *relative* and gradual differences. This makes them no less important. In the information and network society relative differences in getting information and lines of communication become decisive for ones position in society, more than in every society in history before. Giving everybody a computer and a network connection, banning the cutting lines of 'segregation' in this way, will not remove them. Much deeper and clear-cut differences in skill and usage will come forward because both technology and society are differentiating stronger than ever before. The fundamental task of future society will be to prevent *structural* inequalities in the skill and usage of ICTs becoming more intense.

Another reason for the complexity of the digital divide is that there are in fact several divides. Some are widening while others are closing. Time series of official statistics have demonstrated that during the 1980s and 1990s gaps of income, employment, education, age and race in the possession of computers and hardware have not persisted but grown. Clearly, the people at the 'better side' of these gaps have increased their lead during these decades. Though these gaps of possession will (at least partially) close in the next decades, if only for the statistical reason of saturation effects, it is very unlikely that those having acquired a big advantage will stop and lean backwards. Technology is advancing, splitting in simple and highly evolved applications, spreading into society and sticking to old and new social differences.

In the course of the 1990s the gender gap in the possession of ICTs has started to close. However, gender gaps in skill and usage remain or mature, though they are much smaller for girls and boys than for adults.

Large differences of digital skill and usage were observed recently. Here gaps might grow in the future, though this can't be proved at this moment for a lack of time series data.

The conclusions above have also highlighted the dynamic nature of every digital divide. One should not stop at a particular point in time and say: look, this particular technology or application will be available to everybody within a couple of years. Information and communication technology will differentiate considerably in the first decades of the 21th century. Computers will be available in the simplest (palmtop and other) forms and very advanced types of desktops,

laptops and servers. 'The Internet' will be accessible via televisions, mobile phones and other small information appliances next to fast broadband connections. An important policy question will be whether palmtop computer and mobile phone simple access will be sufficient to be called the basic connection every citizen needs. Moreover, what does basic access to the Internet mean: both at home and at work/school or is one of them sufficient, or perhaps even a connection in a public utility?

An important characteristic of ICT in this respect is its extended multifunctionality. Printed media, radio, television and telephone have all been used differently by people with high and low education in particular. However, their (difference in) functionality is small compared to computers and the Internet. In the mean time society is also differentiating at an unprecedented scale. Together they may create a usage gap that is somewhat familiar to the *knowledge gap* described by Tichenor et al. a long time ago. "As the diffusion of mass media information into a social system increases, segments of the population with a higher socio-economic status tend to acquire this information at a faster rate than the lower status segments" (Tichenor et al., 1970, p. 159). Though the evidence in favour of the thesis of knowledge gap has not been conclusive (Gaziano, 1987) it might get another chance in the information or network society where information is a positional good.

The policy perspectives to be linked to this analysis clearly depend on ones central objectives concerning information inequality and ones political position. Central objectives might be twofold. The most basic one is *social inclusion*. A step further is made in the objective of an *equal distribution* of resources or life chances. The first objective is backed by a big coalition of forces in advanced high tech societies. Corporations look for a large electronic market place. Politicians want extended reach for political persuasion and a grip on new channels of political communication bypassing traditional mass media. Military people and security agencies want everybody to be connected for purposes of control and surveillance, as the offliners of the future will create unknown risks. Educators are concerned about universal and public access to all learning resources. Community builders want every citizen to be involved in online communications linked to offline local activities.

The second objective is more traditional and it is supported more in Europe than in the US, for instance. The minimum is an equal distribution of *chances* to every individual, an objective also having a broad support. Filling in what this means for actual material, social and cognitive resources reveals the differences of political position.

The authors of this paper want to link policy perspectives to the four kinds of access distinguished. According to them governments, civil societies and markets all have a job in the support of these kinds of access.

Elementary digital experience is first of all a question of the market developing and offering ICTs that really are user-friendly and that offer such a clear surplus

value as compared to old applications that the 'information want-nots' will be convinced. Even on that occasion many elderly and low educated people and some categories of housewives will stay behind. This will be the most important mission of adult education to be offered by governments, community centres and corporate training.

Concerning the general possession of computers and networks markets have done a good job lowering prices for technologies with higher capacities. However, this has not prevented the growth of digital divides in the possession of hardware, at least until very recently. Household income is still the most important factor here. So, tax and income policies of governments certainly do make sense. However, general tax credits or subsidies are not effective. They have to be *focussed* on the groups clearly staying behind, all of them in the lowest quarter of the income distribution. A second qualification is the need of public or private *service and guidance.* Just offering cheap or free boxes with computers and Internet connections makes no sense.

Learning digital skills will be a strategic objective for educational institutions at all levels. The official American and Dutch surveys cited in this paper indicate that present digital skills are learned more at work than at schools or at home. In general, formal education runs behind because means are lacking and teachers are not sufficiently trained or motivated. Filling in this strategic objective it will become evident that digital skills do not only mean abilities to operate the hardware and software. Increasingly, it will mean the ability to search, select, process and apply information from digital sources.

Improving usage opportunities for all means making them more attractive to some people in the first place. We have observed the surprisingly high independent effects of age, gender and race (in the US) for the actual use of ICTs. Applications should be made more attractive to many old people, women and ethnic minorities. This is a matter of design, culture, language and identity included and addressed in the applications concerned. Producers, designers and representatives of citizens and consumers have a job here.

Structural inequalities should be prevented by more employment, better career opportunities, job rotation, lifelong learning and all kinds of emancipatory politics (elaborated in Van Dijk, 2000).

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