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# Beyond the Digital Divide

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If we study available evidence, the digital divide is closing rapidly. During the last decade, millions of people have gained access to computers every year. Never in the human history there have been so many people with access to computers, digital networks, and electronic communication technologies.

Census Bureau's Current Population Surveys indicate that telephone penetration has stabilized to about 94 per cent in the U.S. Since 1984, computer ownership has grown at least fivefold across races and ethnic groups, and more than fourfold across all age groups. In 1989, 3.3 per cent of American households owned modems. In 1998, more than one in four had Internet access.[2]

Internet use spreads faster than any previous technology. According to a survey made in March 2000, nine million adult women went online for the first time during the previous six months in the United States. African Americans are the fastest growing group: 30 per cent of African American Internet users got online in the six months preceding the survey.[3]

What, then, do we mean by digital divide? Is it only a new name invented by technologists and policymakers to describe an existing divide? Is it a nightmare where Internet explodes the differences, until even the richest will have to pay their share for the

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final collapse of social structures? Or is it a dream of perfect equality: a vision of a world where even the poorest have all the world's information on their fingertips?

Studies on diffusion of innovations show that adoption of new technologies is a complex process. In a given population, the number of people adopting a new technology in a given time often follows normal distribution. Adopters can roughly be categorized as innovators, early adopters, early majority, late majority and laggards.[4]

During the growth phase, differences necessarily grow. As the majority of potential users have not yet adopted the new technology, the gap between average members of the population and early adopters increases. This phenomenon depends on the maturity of the technology. For all new technologies there has to be a time when the differences in its adoption grow.

In Internet the differences are exceptionally visible for a paradoxical reason: it diffuses exceptionally fast. Ten years ago, no-one had access to the Web. Today, in many countries almost a third of the population uses the Web.

In innovation diffusion research, as well as in the discussion on digital divide, the focus, however, is often on a specific technology or a product. Although it is obvious that Internet, for example, is continuously reinvented and has many different uses, we often assume that because we use a single word for it, Internet exists as a well-defined object. It is not, and for this reason innovation diffusion models fail to describe the dynamics of Internet adoption.

Population surveys show that the level of income, education, and family structure correlate with Internet access. Market research, in turn, shows that the best selling computer software consists of tax preparation, money management, and financial planning software, games, virus protection software, electronic encyclopedias, office packages, and some educational software for children.[5] Is it really surprising that people with low income buy less computers?

Think, for example, that you would be an employee in booming North California, making 100,000 a year. Would you be interested in buying a rather basic TV for $8,000, paying

700 dollars per year for its use? According to the Current Population Survey, in 1997 fewer than 1 in 4 households with family income less than 35,000 owned a computer. Multiply by three, and adjust for some change in perceived value of money, and a 1,500 price tag easily seems like a 8,000 dollar investment to a well-off member of the digital economy. Is it not obvious that for a low income family a computer seems like a discretionary purchase? Why would anyone buy a financial planning software without extra money to plan for? Why would one want to hunt for flight tickets or DVD-players over the net, without a credit card number at hand? Is it really a surprise that people with lower incomes are not early adopters of the net?

The current discussion on digital divide often focuses on technology. It argues that access to computers and to the Internet is becoming a key to the full membership in the future society. But, although Internet is important, it cannot be understood without a deeper analysis on its social impact. Future society is not about owning a specific piece of technology.

Ken Goldberg gave a presentation about an interesting computer system. In Quija 2000, several people can collectively move a robot hand through the Internet.[6] Users join their efforts and control the movement of robot arm over a Quija board by moving their mice.

It seems to me that the Quija board will be a major milestone in the history of computing. It has important theoretical implications, and it tells us something important about the digital divide.

According to sociocultural theories of cognition, human mind is a product of social coordination.[7] In the course of cultural development, the meanings humans process emerge simultaneously with specialization of human practices. This specialization underlies human activity, which is inherently socially constituted and oriented towards the specific objective that defines the activity in question.[8]

Social activity, for example hunting for food, emerges simultaneously with the object of activity: food as something that people hunt for. In the process of cultural development, activities become specialized and institutionalized in the division of labor. Division of

labor emerges, for example, when some of the hunters specialize in beating the bushes and making noises to frighten the game, and others specialize in catching and killing the game that runs away from the noise.[9]

The meaning of objects of activity depends on what we do with the object. This “doing” is institutionalized in recurrent social practice, which in the process becomes the substrate and carrier of meaning. The meaning of “noise” depends on whether you are trying to bang a drum as a member of the noise-maker group in community of hunters, or if you are a game-killer to whom all extra noise means failure. Similarly, the meaning of a “hammer,” for example, depends on whether its user interprets the object in the context of being a hunter, a construction worker, a sculptor, or a percussionist in an orchestra that explores the limits of harmony.

If we only have a hammer, the whole world may still look very complex. It may look like a nail, a block of marble, or a drum, or simply a skull to be broken. The complexity of the world and the diversity of its possible meanings depend on the specialization of human practice. On this middle-ground, grounded on collective and collaborative practices, knowledge loses its absolute objectivity and absolute relativity. It becomes bound to sociocultural structures. Many simultaneous interpretations of the world emerge, and these interpretations guide the reproduction of those social structures that produce the distinct dimensions of social reality.[10]

Social structures are maintained by reproducing social practices in everyday life and communication. Without this constant reproduction society collapses, and the order associated with it disappears like an empty anthill in the wind.

Quija 2000 provides, therefore, an interesting example of collaboration. I think it is an archetype; a prototypical computer system in the same way as calculation of differential equations, processing of payroll data, hypertext, and email were in their own decades. It is a collaborative system without division of labor. Everyone is actively doing the same thing. Quija 2000 is located in the point where society, human mind, and knowledge start.

In the real world someone would move the mouse. Someone else would ask the questions. Someone would decide what question should be asked, maybe revising the question as soon as the answer starts to be known. Someone else would be busy rearranging the letters on the board. And, of course, somewhere—in Silicon Valley, perhaps—there would be someone inventing new alphabets while the game goes on.

In a population of ants division of labor is based on phenotype. One ant has a big head, another has wings. In a population of people, division of labor is based on meanings that both produce and reproduce the division of labor. These meanings are communicated through language and communicative action, but also by articulating and organizing the physical world, and by producing tools and technologies that can be used to operate in the world. The system of social division of labor is effective, as competences that are required in specific activities are accumulated during the individual development. But there is no fixed division of labor. All humans have big heads. All specialization is learned.

Human societies, therefore, have always been knowledge societies. Animistic societies were right when they assumed that every stone has a spirit in it. As Husserl insisted, our cognition does not have access to the transcendental stone, the bare stone stripped from all meaning.

In our everyday life, we can be carriers of several social practices. We can be members of several communities and systems of social activity, and speak the different languages of multiple genres.[11] But as long as we are humans, there have to be communities, activities, and languages that are not our own. Society, by definition, can never become a homogenous mass of ideal atoms.

It is important to realize that the atomistic model of society is wrong also in its reverse form. Societies do not consist of individual, unique, and independent atoms, each with their own characteristics and preferences. It is as impossible for an individual to create her social practice and reality from the scratch, as it is to invent private language. Language, practice, and knowledge are intrinsically social and all their extensions are built on historically inherited meaning.

Digital divide is fundamentally about social differences and similarities. Yet is often framed in terms of access to technology. Sociological, economical, and historical studies show, however, that technological possibilities become technologies only in a context of social practice that appropriates technology from its own point of view. Technology is neutral, at least until we have institutionalized it.

In the case of digital divide, we are talking about a world that doesn't really exists yet. Three or four years ago we had more people dying for lack of food and clean water than there were people connected to the Internet in the world. It is highly questionable whether our digital dreams will actually ever materialize. But one thing is certain: access to technology, once again, has become a symbol for something that it is not.

Within a given social context, access to technology may be as important as access to money. Yet, it is also obvious that in many cases the problem and solution are not technological. Even in the best educated and most effective organizations the most productive investment in technology is often to invest in people. The most useful thing is to rethink what we are doing, and why.

In the U.S., social differences are often associated with economic differences. Driving from East Palo Alto to Palo Alto, it becomes natural to believe that progress leads to financial success, and that the differences in a society are both caused by and reflected in money. In other technologically advanced countries—for example in Finland, which still in the middle of 90's had the lowest income differences in the world[12]—it is more natural to think that social differences can not be reduced to economics. There are economic differences, for sure, but it looks obvious that they should more often appropriately be seen as second-order reflections of an underlying social structure.

The concept of digital divide lacks power because it neglects most of this social structure. In an attempt to bring society back to politics dominated by economic concerns, it focuses on technology: the apparently politically neutral question on having the necessary tools for the future society. Implicitly, it gains some political credibility from the idea that being "ahead" in technological change creates regional competitive advantage, as well as

from the assumption that broad use of new technologies in the "home market" enables firms to develop the new ground for the future global economy.

Metaphorically, it assumes that a society can be divided. According to Marx, society, indeed, can be divided: you either own the means of production or you don't. Capitalistic society, according to Marx, is a system that can be understood based on this fundamental difference. In the U.S., the discussion on digital divide often adopts a diluted version of this idea. Ownership is replaced by access to technology, and it is assumed that people can be arranged along a line of increasing wealth, marching past the technological signposts of progress, carrying in their baskets everything they own and earn: the aggregate weight of accumulated capital, goods, and wages. Or society is divided along racial boundaries, thus reproducing race as a distinctive factor in society.[13]

Schumpeter's insightful critique of Marx highlighted the dynamism of class boundaries in capitalistic systems, and showed how the process of creative destruction continuously revolutionizes the economic system from inside.[14] According to Schumpeter, innovation and entrepreneurship drive this process, at the same time reorganizing and breaking the boundaries between social classes.

The concept of digital divide, as it is used today, is therefore a rather diffuse concept. Fundamentally, it requires that society can be divided in a meaningful way. The dimension along which this division occurs varies according to the speaker and the audience. The great dividing line is sometimes assumed to lie between center and periphery, leading to discussions on regional development. Sometimes it is drawn between age groups, levels of education, gender, income, reputation, attention, or visibility. Yet, very few studies that would show that digital divide actually is a problem for some people exist today. Instead of admitting that there are many borders in constant movement, and that it is often possible to work one's way around obstacles, we try to locate a single border that could tell us when someone is inside or outside.

When we talk about digital divide, I think we are actually talking about three different things: access to economically useful resources, access to meaningful social interaction, and access to individual development. Current population surveys give us very little to

understand these. The discussion on digital divide often takes for granted that future work occurs through the net, that communities and societies will become virtual, and that human potential can be realized using advanced information and communication technologies. Some people seem to think, further, that individual realization can more exactly be defined as buying things through the net.

One version of the story is that digital divide means that those who have access to the net become more equal than others. For example, sometimes people assume that consumer wealth increases if everyone has access to the net. We often talk about digital divide as if it would be possible to make everyone rich, at the same time keeping the world as it is. But, of course, a world where everyone is rich—or where all products are free—is a very different world. In the extreme, it means that economy, in the conventional sense, becomes irrelevant. The attempt to reduce social differences into politically neutral and objective economic differences is an understandable reaction in modern democratic and technological societies. But, although money seems to equalize and abstract away all differences—in the process becoming the only thing that makes a difference—it is itself based on differences.

While waiting to see whether the ongoing experiment with the new economy is a transient wave that in a broad sweep destroys the structures of industrial capitalism and leads to the profit squeeze predicted by Marx and Schumpeter, it is important to remember that consumption eventually depends on division of profits. It may be that the idea that society is about consumption and market may need to be reconsidered. Market is one area in the public space, but it is not the whole society. The boundaries between agora, theater, home, and cities depend on culture and they change in the course of cultural change. Cultural change, in turn, is very much about technological change. In that sense, Internet is important.

According to the sociocultural theory of cognition, the big divide between humans and apes emerges when humans start to develop social division of labor.[15] In that process language emerges as a media that makes this division possible, simultaneously institutionalizing this social specialization in concepts that are used to make sense of the

reality. Technological and cultural artifacts and tools crystallize the emerging social practices, both constraining and enabling the reproduction of social practices.

So, what, indeed, do we mean by digital divide? Are we trying to say that technology is now very rapidly changing those mechanisms that made society possible in the first place? Are we saying that the information highway is becoming a new route to social mobility? Are we saying that you can not any more understand computers without understanding society? Or is it just like it used to be in AI: just when we are getting ready to implement the whole thing, we are starting to realize that we really didn't understand what we are talking about?

Maybe Internet teaches us that learning is very much about knowing how others know their world. Maybe it teaches that knowledge has very little to do with information, and very much to do with activity, commitment, and social practice.[16] Maybe Internet even shows us that the First Amendment is theoretically wrong: social interaction is never neutral, costless, or purely individual—and therefore free speech is as rare as a free lunch. If so, Internet and the human-centric view on computing will have major implications for educational practices, democracy, economy, and—for a lack of better words—the meaning of life.

Play with the idea. That's how we learn something new.

[2] U.S. data on telephone, computer and internet use can be found at http://www.census.gov/population/www/socdemo/computer.html, (Kominski & Newburger, 1999), and in NTIA reports on digital divide (e.g., NTIA, 1999). Census surveys do not take into account wireless phones.

[3] The study was conducted by the Pew Internet & American Life Project. The results are reported in (Kanaley, 2000).

[4] (Rogers, 1995)

[5] E.g., World Almanac and Book of Facts, Top-selling software, 1999.

[6] Goldberg, Chen, et al., 2000

[7] Sociocultural, or cultural-historical, theories of cognition originate to a large extent from the Vygotskian school. The core ideas of sociocultural theory (Vygotsky, 1986; 1978) were developed by Vygotsky's students and colleagues in the Soviet Union after his death in 1934. A.N. Leont'ev formulated these ideas as cultural-historical activity theory (Leont'ev, 1978, Zinchenko, 1995). Engeström further developed the theory of activity systems in his dissertation on expansive learning (Engeström, 1987). Since 1980's, he and his colleagues have applied the model of activity developed in his dissertation to work development, adult education, organizational development, knowledge management, and innovation studies (e.g., Engeström, 1999b; Engeström & Middleton, 1996; Engeström, 1999a; Miettinen, 1999). In the U.S. sociocultural theory, and to a lesser extent activity theory, has been extensively studied by, for example, Cole (1986; 1996), Wertsch (1991; 1998), Scribner (1997), and, for example, Salomon (1993).

[8] The concept of "object-oriented" activity has been discussed in detail by Stetsenko (1995). I have discussed it in the context of constructivistic and phenomenological epistemology, in Tuomi (1999).

[9] The emergence of structures of activity and division of labor is discussed in (Leont'ev, 1978), and in (Axel, 1997).

[10] In sociology, similar views have been developed by Schutz (1967), Berger and Luckman (1966) and Giddens (1984). Niklas Luhmann has developed a theory of social systems that views societies as self-producing communications, and social "structures" as something that communication creates to reduce the inherent complexity and unpredictability in social interaction (Luhmann, 1995). Luhmann's theory is partly based on Maturana and Varela's theory of autopoietic systems, which links it to their phenomenological

theory of cognition (Maturana & Varela, 1988). In this theoretical context, language emerges as "structural coupling" on the level of collective meaning processing. I have discussed this idea and its links to the activity theoretic view on cognition in detail in Tuomi (1999).

[11] Communities of practice were discussed by Schön (1983), Lave & Wenger (1991), and Brown and Duguid (1991), activity systems by Engeström (1987), and speech genres by Bakhtin (1987). I have compared these, as well as Fleck's (1979) though communities in Tuomi (1999).

[12] In Finland, 1997, the richest 10% of the population had 4.6 times the income of the lowest 10%, after social transfers. At the same time, it had more Internet users, internet connected hosts, and wireless phones per capita than the U.S.A.

[13] In a paradoxical way, the attempt to remove racial and ethnic inequalities requires that race and ethnic origin are made determining factors in social structure. Coming from a country where race is rarely an issue, I can't but wonder if this focus on race is useful in the long-term. Census Bureau, NTIA, and others in the U.S. often highlight differences in technology adoption among racial and ethnic groups. Race and ethnic origin are, however, qualitatively different from other demographic groups, as they assume that people remain in these groups for their whole life. There is no social mobility across racial boundaries. The concept or race seems to be inherently racist. When digital divide is defined in these terms, one could argue that it unintentionally reproduces the problem it tries to address.

[14] Schumpeter (1975).

[15] Vygotsky and Luria (1992).

[16] Tuomi, (2000).

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