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Experiments along the bazaar-route: the importance of user-producer dialogue in shaping new media technology

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The Internet for all?

Technological mediation involves representation and inscription in the world.[1] One may therefore claim that engineers become sociologists through their development of hypotheses about what other people want and need. As a result, a large part of the work of innovators becomes the writing of user-values into the technical content of new objects and then the enrolling of other actors in support of these inscriptions (Callon 1987). These inscriptions, however, do not only apply to the artefacts as such but also to the situations in which they are used. In this way mediation translates and converts. I have earlier argued that science and technology mediation takes place in accordance with three different communication routes: (1) *the direct route*, (2) *the middleman-route* and (3) *the bazaar-route* (Hetland 2002). The direct route is associated with a clear definition of who is the sender and who is the public. It is the expert who popularises or problematises the scientific and technological knowledge for the general public. The middleman-route is associated with a notion that the expert does not understand the media's possibilities and limitations, or does not have time, or does not see the news value of the research material. Professional communicators therefore become necessary. The bazaar-route is an expression for a complex communication situation. What is relevant knowledge and how this is understood by different actors is the object of a dialogue.

This dialogue is of special significance in what Callon calls hot situations (Callon 1998). In cold situations it is easy to identify actors, interests, preferences and responsibilities. One can therefore call in the experts and their laboratories. In hot situations most things are the subject of controversy, and those who are laymen want to have their say. These controversies are an expression of the fact that one does not have a stable basis of common knowledge and insight that one can agree on. Therefore technology producers, politicians and the media all see it as important to open up the way for feedback from the public in the diffusion process. The basis of common knowledge and insight that people formerly agreed on is constantly undergoing more frequent change. The establishing of common frames of reference is therefore a complicated process, particularly in hot situations. In such situations the way is also opened up for what Callon calls overflow. Overflow is an expression for the fact that complete framing is in many ways impossible. The degree of overflow is therefore an indication of how stable the frames are. Callon intimates two different ways of understanding the relationship between frames and overflow. In the first case establishing frames is the normal thing and overflow is leaks. In the second case overflow is the normal thing and the constituting of frames has high costs and will always be deficient.

In this chapter I shall explore the bazaar-route with my point of departure in a social experiment that was going on at the same time as the Internet was being introduced to the public. I shall therefore look more closely at how a small group of users mobilised different arguments in the task of making their mark on the political agenda. The analysis takes as its starting point two important characteristics of the emergence of new media technology: 1) the highly developed capability of the modern economy to produce and diffuse user-values with new characteristics and 2) demonstration experiments as quasi-experiments[2] creating an arena for interaction between users and producers. In demonstration experiments potential user needs for and potential user-values of new technology and new services are communicated between users and producers to facilitate re-invention and diffuse innovations. Demonstration experiments have often been used to promote special solutions among selected user groups to increase the general level of knowledge. They therefore represent a hybrid composition of technological and social innovation processes. In themselves they are excellent examples of the bazaar-route. To illustrate the methodological

points I have used examples from one demonstration experiment in which I have participated: the adaptation of the Internet to the dissemination of public information to users with visual impairments.

Politicians in large parts of the western world have put phenomena like 'the information gap' or 'digital divide' on the agenda. Enormous resources are to be used to remove the digital inequalities. In this work it is possible to identify different understandings of these digital inequalities. Three prominent ones are 1) access, 2) digital literacy and 3) confidence. With increasing access an interest has arisen in what is called *digital literacy*. This interest attempts to penetrate behind superficial views of the kind that 'the technology is so user-friendly that anybody can use it'. Any parallel comparison at all with general literacy, that is to say the degree to which the citizens are able to read and write, indicates that there are great differences here. I shall distinguish between two main forms of digital literacy: (1) tool literacy and (2) literacy of representation (Tyner 1998). Among literacy of representation one find *visual literacy* for understanding and using visual images in a communicative context. Automation has so far and to an increasing extent presupposed that the users act on the basis of visual impressions. In relation to the visually impaired, technological progress may therefore be experienced as the opposite. When it comes to technology policy one therefore observe a growing interest for *universal design* or 'Design-for-All', as it is also called. This makes it important first to take a closer look at the importance of design in relation to the digital divide and thereby also digital literacy.

The importance of design

In the infancy of computer age, only experts had access to this technology. With an extended user group, the desires for greater user-friendliness also arose. It will always be problematic to define user-friendliness, not least because the users constitute a multifarious group. Seen in a historical perspective, we can however link user-friendliness to the development of different interfaces. To study user interface we can start off with the hypothesis that machines display, at least in principle, interpretative flexibility. This opens the way for a study of the construction process (as a process of inscribing or writing) and of use (as a reading process). The relationship between the reader and the

writer may be understood as being mediated by the machine and the interpretations of what the machine is, what it exists for, and what it can do (Woolgar 1991). Notions of future use and users of technology are in other words an important element in technological development. Suppositions about gender, competence, job performance and working environment in the relevant target group become an important part of technological design and become firmly anchored together with this. In other words, we meet technological objects not only as tools but also as bearers of meaning and of the interpretation of social and societal relations. These are properties that do not however prevent the users from re-interpreting and/or re-inventing these objects. It is therefore important to make technological problems comprehensible on the basis of the context in which the technology is placed. An obvious starting point in order to achieve this aim is to have a closer look at how technology constantly undergoes changes.

The different strategies for interface design between users, the programme and the digital machine from menus to function keys and interactive graphic objects, reflect the degree of competence and control that one assumes the user has or must have. In 1981 Xerox launched its Star machine, which was a market fiasco but at the same time a model for the future user interface – the graphic user interface. Star was the first computer on the market to organise text production by means of pictures, or icons, in a visual language. Furthermore the machine made possible direct manipulation of graphic symbols by means of a mouse. The successor to Star, Apple, further developed the graphic user interface which became dominant for all machines/programmes in the course of the 1990s. This user interface was developed for the *male knowledge worker* (Hofmann 1995). The Star designer assumed that what the knowledge worker learnt about the use of computers was just as quickly forgotten as it had been learnt, because these people were not regular users of the technology. It was this large new group of part-time writers that now became the interesting target group for new word-processing programmes. The knowledge worker as a 'dilettante' at the computer was now the user who was written into the programmes. The needs and the competence that the knowledge worker has, have since laid the foundation for a universal standard for user interfaces.

Consciously or unconsciously, different schemes of events are therefore written into the technology. It is thus the social scientist's task to

decipher these scripts in order to increase our insight into why technology functions as it does. If you are among those who are reading this book in the form of black writing on white paper, then you are reading *black writing*. Black writing designates, among many who are visually impaired, the type of writing that sighted people read. As a metaphor it may just as well mean that so-called ordinary writing is inaccessible. Against this background this demonstration experiment, e-com, took its starting point in the situation that: (a) people with visual impairment today have no simple access to public information, either from the central or local authorities. This applied particularly to information about rights and obligations and (b) the public administrative authorities have only to a small extent seen to it that the visually impaired shall be able to communicate by means of new media technology (Hetland 1996 b). Eighty people who were visually impaired took part in e-com, and the information to which one had access was made available in three different forms (the proportion of users in e-com who read in the manner in question is mentioned in parentheses): (1) as magnified writing on the screen (31%), (2) as Braille on a reading line (53%), (3) as synthetic speech (16%). Some of the participants who used synthetic speech, used it to navigate around in the text or for rapid reading, but for closer reading they read the text by means of a reading line.

Text can be written out in permanent writing – either as black writing (for those who can see) or in Braille (for those who are visually impaired). In addition Braille users can also be given fleeting presentations of Braille, corresponding to the presentations that sighted people get on the screen. The most common form of tactile presentation of this kind is an electronic reading line. Typically an electronic reading line for Braille consists of a single row of either 20, 40 or 80 sign-cells. Each sign-cell consists of a matrix of 4x2 points (4 vertically, 2 horizontally). Each point in the sign-cell is individually driven by a separate motor. In this way each individual sign-cell can generate any letter or figure whatsoever. The visually impaired often use great magnification on the screen and can take in five or six letters at a time. The blind use a reading line, but their fingers perceive only three or four letters at a time. People who have become visually impaired in adult life will as a rule have problems reading equally fast from a reading line as those who have learnt Braille as children. *People therefore act within frameworks of action which are partly constituted by the media, at the same*

time as the media are not neutral tools; they colour and shape actions. Without falling into technology determinism one can thus state that it is interesting to study the coming into existence of technologies, because the resulting technology has significance and it is interesting to study its use and to concentrate on the variety of ways in which the same technology is used, since both technology and the way it is used have significance. In other words new technology has ambiguous consequences, and it can often be exploited in various ways with different results. Therefore it is necessary to analyse technology as a process in which a number of choices are made rather than to observe the choice that has been made when a given technology has been made available.

The different problems the user faces are an important source for the description of how solutions are designed in relation to the users. Experiencing crisis also allows the setting to be described; 'if everything runs smoothly, even the very distinction between prescription and what the actor subscribes to is invisible because there is no gap, hence no crisis and no possible description' (Akrich & Latour 1992: 261). Crises and problems are therefore our most important gateways to understanding what is happening. A blind person's meeting with the automated post office illustrates this point:

In the past you could simply queue up and you were served when it was your turn. Now you are marginalised by having first to find the machine that dispenses queue numbers and then press the button for a ticket. Then you must get somebody to read aloud for you what number you have been given and which number is now being served. You then try to count the pips until they reach your number, and if there is only one queue, you count correctly, but if, for example, there is one queue for ordinary services and one queue for foreign exchange, so that you cannot keep track of the pips, you must get somebody to tell you when it is your turn. If that is not enough, you must also get somebody to tell you which till you will be served at and then you must get somebody to take you to that till.

At an early stage it had been thought that the queue number syst

em could create problems for the blind. In an early system that was installed in some places in Sweden, when the customers came in, they broke the beam of light of a photo-electric cell. When the beam was interrupted, a machine with stored speech was actuated and it told the customer that this was a post office with a queue number system. The customer was referred to a service button on the queue number

dispenser and if one pressed it, the number one had been given was read aloud. When it was the turn of the customer concerned, this number would automatically be read aloud over the loudspeaker system at the same time as a buzzer would be actuated at the till with the number in question. In this way the blind customer was guided to the correct till. The solution that was tried out in Sweden thus illustrates the fact that it was not the technology that made necessary the exclusion of the blind.

The Norwegian version of the queue number system involves a number of changes. Among other things it involves a redefinition of what a queue jumper is. This is no longer a person who has been waiting for a shorter period of time than you have, but also a person who lacks a queue number and who either believes it is his/her turn or chooses to challenge the *user representations* that lie in the queue number system. Some blind people therefore choose to invoke their 'blindness', or to protest against this 'blinding', by going straight to the till and asking for service. Since those serving find it difficult to dismiss this strategy, these people will as a rule be served at once. The disadvantage of such a strategy is of course that the blind person is thus forced to confirm that s/he is disabled in relation to the user representation that lies in the queue number system. In other words the whole apparatus of technology and service producers right down to the end user contributes to a definition of the user and thereby also establishes parameters for the user's actions.

The special properties of a special screen image, or of the queue number system at a post office, must be understood on the basis of the cultural values and notions that precede design and the process of introduction – not as a reflection of specific technological possibilities. Script is therefore an important type of cognitive structure. Akrich and Latour see script as a series of actions inscribed in the technology by the engineer, inventor, manufacturer or designer (Akrich & Latour 1992). We have scripts for how plays are performed at the theatre, for ceremonies and also for daily phenomena such as visits to the post office. It is common for scripts to include remedies (queue numbers and screen images), roles (customer, fellow customer and person serving) and rules for the sequence of events (taking a queue number, waiting in the queue, going to the right till and being served). One of the most important sub-scripts that is placed in much of new technology is connected with the phenomenon of visualising. Here, one may also say that the script is con-

nected with the general process of automation in which personal contact is replaced by machine contact. The sense of sight is thus made one of the technology developer's most important *frames of reference* in development work; a high level of visual literacy is therefore made necessary. In what follows I shall therefore have a look at some of the problems that were registered and the solutions that were chosen when the presuppositions relating to visual literacy were present only to a limited extent.

Digital literacy translated

Digital literacy is a question of a two-sided relationship. It is not simply the case that the users need a certain digital literacy in order to manage the technology at a certain level; it is also the case that particular technological solutions *require* a particular literacy. These requirements are often decided in the development and design process. Special user groups with physical or mental disabilities illustrate the problems that are often created in this connection. People have therefore been concerned with the fact that different user groups need technological solutions adapted to their needs. In practical policy this has manifested itself in an interest in universal design. We can say that a particular type of design presupposes particular literacy among the users; a given design in other words configures the users in a particular way. The purpose of universal design is to prevent unnecessary configuration of the users. The distinction between tactile mode and visual-symbolic mode is crucial for the visually impaired. In text mode the characters are transmitted to fixed positions on the screen (a specific number of characters per line, a specific number of lines per screen, for example). In graphic mode the information is transmitted to the screen as points. Therefore it is not possible simply to translate a picture of a character so that it can be presented in Braille and synthetic speech. Menus are a complicating factor for the visually impaired, not only because one must find one's way about on the screen before one chooses anything, but also because attributes (colours and the like) are used to mark positions instead of the computer's standard cursor. The cursor is the point on the screen at which one must direct one's attention, a point of orientation. In such cases special equipment for Braille and synthetic speech will not simply go ahead and recognise what is the cursor. A window is a delimited field on the screen, often with a frame around it. Furthermore, it may overlap other windows. One window is the active

window. When one can read several windows on the screen at the same time, it is difficult for the visually impaired to decide which window is the active one. People with weak sight get another type of problem; when the screen image is magnified, one sees only a small part of the screen.

The purpose of e-com was to find out how public information could be made available to the visually impaired in the best possible way. A desired effect of e-com was that one should conserve and further develop suitable communication software for the visually impaired, who could not make use of the present graphically oriented user interface. In keeping with the development of new graphic user interfaces, a desire was formulated for continuous and goal-oriented development of software for the visually impaired. In the light of this e-com saw it as an objective to develop itself into a centre for electronic communication for the visually impaired. Further e-com saw it as an advantage not to use synthetic speech as the only medium, for two reasons. The systems that were used were not good enough (this applied in particular to languages of limited diffusion), and speech did not provide the opportunity to discover how words were spelt. It therefore became important to give the visually impaired the opportunity to maintain a written language of their own. Adaptation was therefore looked on as a means to reducing the information costs for groups, who on account of different factors had to bear far higher information costs than the expenses other actors experienced. On the other hand e-com emphasised that the aim of adaptation was to give the individual user possibilities of solving problems off her or his own bat. Adaptation was therefore an obligation that was partly incumbent on the sender – the message was to reach the whole target group – and it was an obligation that was partly incumbent on those who were responsible for different infrastructure measures – the infrastructure must not set up barriers to accessibility.

E-com implemented a number of different measures to demonstrate the importance of adaptation, and here I shall only briefly present two of the most important ones: the newsletter and the local government elections in 1995. The newsletter was the original core of e-com. In the course of the project period (1995-1996), 33 issues were published – in the beginning one every fortnight – from the autumn of 1995 one per week. After the first trial period the newsletters contained on average 20 news reports. For all the newsletters the content consisted on average of news from state bodies

(42%), local news from municipal bodies (15%), news from the Storting, or Norwegian national assembly, (11%), announcements (5%), and miscellaneous news (27%). The length of each news item varied somewhat. In an intermediate period the news items varied in length from 50 to 200 words, with the greater part being between 100 and 150 words. A midway evaluation elicited the response that many wanted greater variation in the length of the news items, which indicated that the user group was more heterogeneous than had originally been supposed. In the autumn of 1995, e-com started an additional project called Local Government Elections 1995. The point of departure was that the visually impaired had had limited opportunity to become involved in the elections in a 'democratic' manner. That is to say that they seldom received information about the names of the candidates on the list and they were seldom able to use their right to move candidates up the list or to delete candidates' names. Municipalities were chosen according to where interested users lived. The fact that the electoral lists were included meant that the names of 25 000 local government politicians were put on the net. Those who were used to reading by means of a reading line/synthetic speech had had few aids provided when it came to reading electoral lists and other material about the elections. Especially those who were completely blind therefore found this measure useful.

The newsletter entailed specially adapted information. In this connection, two conflicting signals emerged. The one signal was that the visually impaired wanted to have access to the same information as normally sighted people. The other signal was that the visually impaired wanted to have an adapted text that was as effective as possible, so that they too, as rapidly and effectively as possible, could have access to the information they wanted.

Once I have submitted a contribution to a discussion, I'm more or less obliged to follow the whole discussion, no matter how much rubbish there is in it. After all, it may happen that they attack me on some points, so that I must respond. It's just as difficult as keeping up with newspaper debates with readers' contributions. And all this boils down to the fact that I, as a blind person, can't have an overview of such huge amounts of information as those who can see can have an overview of. The acquisition of information is slower. This is a limitation that the disability sets, whether you like it or not. So I think it's fine that the information, at least the information that is specially adapted for us, is concentrated.

The importance of adaptation was documented in the course of the project period, and six examples were identified of how different scripts and

frames of reference cause communication problems for the visually impaired: (1) The party one is communicating with does not understand what possibilities the visually impaired have to acquire relevant information. The information thus becomes inaccessible, not because the visually impaired person cannot acquire it, but because the person who is to communicate it believes it to be inaccessible. (2) The sender demonstrates lack of insight into the problem of accessibility. (3) The visually impaired are defined as a non-relevant social group. (4) The visually impaired are not considered as equal partners in the communication situation. (5) The sender lacks the necessary rights to make the information available. (6) The public room is privatised. In what follows I shall deal with an example of crises.

Many of those taking part in e-com had experienced the sender's problems in relating to the visually impaired as equal partners in the communication situation. One of the users contacted Vinmonopolet (the Norwegian state monopoly of wines and spirits) to obtain its price lists with information about the selection of wines and spirits offered, in electronic format. The first telephone call resulted in the answer that this was impossible. Since this was a bit difficult to understand, seeing that the lists certainly existed in electronic format, he pursued the matter. The story received good press coverage in several papers. In an interview the PR Officer at Vinmonopolet promised to look into the matter again, but commented at the same time that 'We would rather co-operate with the interest organisations in such cases'. This case illustrates a general problem that the visually impaired often experience, the problem of delegation. One comes as an individual to get information. If one is so lucky as to get a positive response in the form of promises to make information available, it often turns out that the organisation or firm concerned would rather act together with another organisation, as in this instance, the Norwegian Association of the Blind. After this incident had been widely reported in the press, Vinmonopolet finally made contact with e-com. They were not very happy about all that had been written in the papers. After a while e-com at last received the electronic text. It took e-com three to four hours to adapt the information. It turned out that what in the beginning had been claimed to involve enormous technical problems, was in reality simple to solve.

The composition of the target group constituted, however, a central challenge. E-com's target group was people with visual impairment, and this included both blind and weakly sighted people. In the project it was discovered that the needs and wishes varied greatly within the tar-

get group. This was due partly to the degree of residual vision. Those with weak vision will more easily be able to relate to visual presentations, while information for the blind requires a greater degree of adaptation. There were therefore different views among the poorly sighted and blind about what was a good user interface. Many weakly sighted people very much wanted to keep up with technological development in the way in which it appeared to those who could see. Some visually impaired users were therefore provoked by e-com's focusing on adaptation and made statements like 'I don't want to be told what is best for me by people who see worse than me'. Correspondingly many blind and very poorly sighted people found it provocative that they were to adapt to a graphic user interface that seemed more of a hindrance than a liberator with respect to the possibilities of communicating.

It is often claimed that when a particular technological solution fails, it is because it does not meet the real needs of the users. This type of statement illustrates a superficial understanding of the concept of need. When it comes to new technology one must very often see the solutions before one can formulate the needs. The concept of need in our context is thus relative and not absolute. Furthermore we can distinguish between two different contexts for the use of the concept of need, need as (1) a logical necessity in the sense that in order to talk to a person in another town in real time I have a need for a telephone, and (2) experienced needs or wants. Need is often treated as if it were stable over time, although few phenomena undergo so many changes over time and between different actors. Experienced needs may, incidentally, also be 'substitutes' for other types of need. In most social experiments users are recruited according to a notion of the future user. However the problems of user studies include situations like the following (Woolgar 1994: 202):

- the user does not know his/her requirements
- the user knows his/her requirements but cannot articulate them
- the user changes his/her mind
- individual users say different things to different people
- users disagree as to what their joint requirements are
- individual users are not representative of (all) relevant users
- the user turns out to be a customer rather than just a user.

Many needs studies in new technology are of little value precisely because there is no clarification of how different types of need are perceived and of the degree to which the actors represent different relevant social groups. One mistake that is often made is that heterogeneous social groups are categorised and common needs and aims are ascribed to them. The demonstration experiment of Internet solutions for the visually impaired illustrates how apparently homogeneous groups may interpret technology, needs and goals extremely differently. E-com resulted in a thorough debate within the user group, which again revealed different perceptions of how the user is included, or ought to be included, in the development of new media technology. The visually impaired therefore grouped themselves into different formal and informal groupings, who signalled different policy standpoints on their interests, but also different cultural understandings of new technology.

In the next section I shall describe some standpoints that were established around e-com's attempts to make adaptations to facilitate the use of new media technology. Even though I shall not be placing great weight on the emotional component of the three standpoints, it must be stressed that this component was at times extremely important, with 'flaming' as one of several elements in the debate.

Framing and overflowing

E-com was looked upon by those who took the initiative as an important democratic project. The democratic project was, however, contested by other actors. When e-com protested against the fact that others were 'stealing' the documents they had adapted, the 'thieves' protested, claiming that the information should be free for all. While e-com turned to the traditional mass media and mobilised traditional supporting players, e-com became the subject of debate and expressions of opinion in a number of contexts, not least on different computer bulletin boards. We therefore witnessed a marked overflow between frames and media. It was simply matters of chance that led to e-com's being informed of this type of overflow. E-com claimed, in this connection, that it would have been natural for the debaters and the person with editorial responsibility to have given e-com the opportunity to answer various attacks. The feedback that was given was that e-com ought to know that people were dis-

cussing e-com in various places on the net. The implication was that it was e-com's responsibility to keep up to date with *where* the debate was being conducted. These debates demonstrate how difficult it is to make oneself the spokesman of a particular understanding of access and literacy. This understanding will quickly be problematised because one form of access is easily felt to be restrictive for others. Three frames dominated the debate.

'The Internet is a juggernaut that cannot be stopped'

It is difficult to resist development, so we must therefore see what comes and adapt the solutions of those who can see to those who are visually impaired. Adapting to supply often means that the solution to the problem is localised with the visually impaired person. The communication situation is to a great degree defined by the sender. In the course of the project period there was thus a large group who expressed views in line with the following: 'I don't believe one can count on converting all the *Windows* programmes to DOS. That would be like believing in Father Christmas. You can't stop development'. Adapting to supply was therefore perceived as important. This frame was linked to the metaphor of the information superhighway. Development was seen as something inevitable, to which one had to adapt in the best possible way, since one was not in any case among those user groups who would be able to set the agenda for how technological development was to be steered.

'The Internet is freedom'

Technology is both a tool and a life-style. This perception emphasises technology as a liberating force. One sees the user as an active force in the development of technology. The individual has far more opportunities than limitations. Experimental activity requires a wide framework, so one does not want any restriction on the freedom to experiment. As part of this notion great weight is placed on the freedom of the individual to try out and design new solutions. For certain relevant social groups this is in fact the core of the Internet technology or the Internet culture. In the project it was therefore clearly established that one would not be limited to 'e-mail'-like communication. This frame was linked to the metaphor of Cyberspace. One did not want to be told what freedom was, freedom was also freedom to define what freedom should entail.

'The Internet is liberation from the body'

The initiative-takers behind e-com framed the Internet as liberation from the body. This frame was linked to the Cyberspace metaphor. The technological development 'was locking them out of the net'. It was therefore a superordinate aim to ensure that the body with all its weaknesses was made 'invisible' in the technological development. Or as one of the initiative-takers behind e-com said in a newspaper interview: 'Most of my net friends don't even know I'm blind'. Technology is therefore not interesting in itself, but it is important to focus on the social and societal role of technology. In this connection the dialogue between user and producer is of particular significance. Those who initiated the project had therefore problematised the development of graphic interfaces in relation to the visually impaired and had the aim of becoming spokespersons for the development of solutions for the visually impaired on the latter's own premises.

The three principles: 1) the pro-innovation principle, 2) the domestication principle and 3) the anti-diffusion principle, are central in all science and technology communication (Hetland 2001). The pro-innovation principle implies that an innovation ought to be diffused and adopted by all the members of a social system. Often this new benefit ought to be diffused more rapidly than is already the case. In contrast to the pro-innovation principle we find the anti-diffusion principle. This principle takes its point of departure in the fact that there is an innovation (or invention), but says that for different reasons this innovation (or invention) ought *not* to be either diffused or taken into use by particular user groups or by society in general. The principle in between is the domestication principle. This principle is a variant of the pro-innovation principle. That is to say that one does not reject the innovation, but takes as a starting point the idea that new technology entails great and important problems that must be solved before the media technology is taken into use in full.

The disagreement about a particular framing can be explained in several ways. A likely explanation is that this notion reflects what one believes to be possible. The visually impaired have experienced the fact that media technology develops on the premises of those who can see. It can therefore be difficult to win support for the needs of the visually impaired. Adaptation to a certain degree of technological determinism may therefore be a natural option in such a context. However, also the more 'liberating' notions have deterministic undertones. The first two

frames entailed acceptance of the pro-innovation principle. The two groups that were most critical of e-com put the focus on the enrolment of new artefacts/properties; in their opinion the result should be more possibilities of choice for everybody. E-com focused on the domestication principle; both the technology and the users were to be domesticated to ensure a desired technological development. Carried out in a creative manner demonstration experiments may therefore have an *important agenda function* and may be a catalyst to bring forth different problematisations and thereby overflow between frames. Thus demonstration experiments show the *variation* in interpretative flexibility.

During the past 20 years a number of social experiments with new technology have been set up. These experiments in many ways form 'hybrid' communities in which the intention is to investigate how technology can constantly give the acting human being new possibilities to transform and develop the social and economic area. Linked to the 'diffusion of innovation' model within traditional innovation theory, we find four types of experiment: (1) explorative experiments (2) pilot experiments (3) demonstration experiments and finally (4) replication or dissemination experiments. These four experiments are placed along the S-shaped diffusion curve.

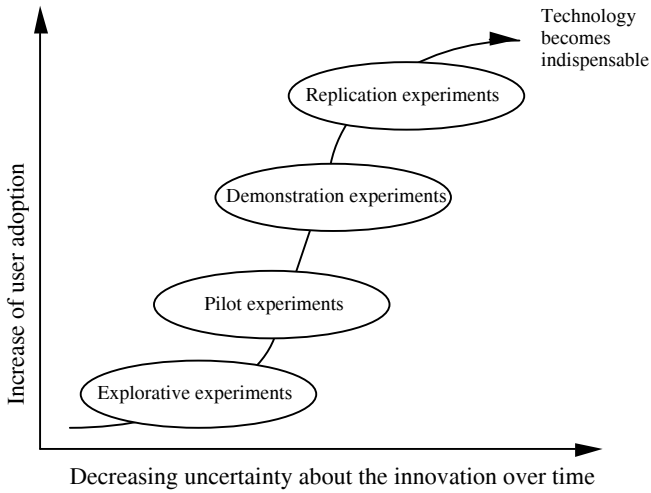

Figure 1: *Different stages in the experimental process (Hetland 1996a: 16).*

According to the diffusion of innovation model 'laboratory' experiments are experiments at their most explorative stage, at which we can study the social relations that media technology is included in, or at least the relevance of media technology to different user groups. The aim of pilot experiments is to increase the attention focused on new technological possibilities, to stimulate debate and to open the way for the shaping of technology policy. Demonstration experiments are important tools in publicising and spreading media technology. They have often been used to promote special solutions among selected user groups to increase the general level of knowledge and thus also promote a more rapid diffusion of new technology. When technology is well known among both technology policy-makers and many user groups, replication or dissemination experiments have been used to disseminate methods that have been tried out, techniques or models, and they thus give the innovators local experience before full-scale introduction of the technology among new users.

Different user groups participate in the social experiments and try to shape the results. In addition to negotiating one's way to desired results and interpreting these in relation to specific interests, one also interprets and negotiates about the 'internal logic' in the experiments. Seen from the participants' point of view a 'laboratory' experiment, pilot experiment, demonstration experiment or dissemination experiment does not imply locked roles. One can also negotiate about the role the experiment has been given as a starting point. There is therefore a clear tendency to translate the experiments in the earliest phases of the diffusion of innovation model in such a way that pressure arises to transform the experiments into later stages of the diffusion of innovation model. This is because some groups of participants are first and foremost interested in these experiments resulting in successful and lasting activities. E-com was a demonstration project aimed to show that particular user groups needed particular user interfaces and particular forms of adaptation. To achieve the predicted success of the demonstration, the project was guided by a set of principles. First they offered low risks for the participants. In e-com this was attempted by strategies for the enrolment of all important national actors. Furthermore, they thought they had a rather good knowledge of adaptation, since they could build on the experience of several earlier failures. Secondly, the project designers tried to make the benefits of the new information system visible to

the potential users. However at this point they had problems with the users since the users turned out to be a heterogeneous group. As a heterogeneous group they could not reach agreement on needs in common. The fact that e-com was in addition working to develop into a centre for electronic communication for the visually impaired meant that the door was opened for a conflict between different user groups. What therefore at the outset was defined as a specific type of experiment took on board problems that rendered the original definition of the experiment less meaningful.

The bazaar-route to technology policy

The bazaar-route opens the way for hot situations. In hot situations most things are the subject of controversy, and these controversies are an expression of the fact that one does not have a stable basis of common knowledge and insight that one can agree on. In other words, what were at the outset good intentions invoked extremely different markings of interest. E-com failed in its attempt to establish a centre for electronic communication for the visually impaired. There is much to suggest that in this connection a perception arose that e-com was in the process of gaining a monopoly of communication/adaptation of information for the visually impaired over the Internet. Beyond the fact that there was disagreement about what adaptation actually meant, this perception suggests that other actors too were beginning to realise that e-com's choice of media technology, i.e. the Internet, was an important strategic choice.

The hot situations were useful in a number of ways. (1) Policy authorities gained insight into how heterogeneous seemingly homogeneous groups were, (2) The importance of the Internet was demonstrated to a host of user groups, who could again explore the net in their own ways, (3) The importance of adapting became central in public information policy; adaptation was nevertheless defined in relation to a far greater span of user needs than was the point of departure for this demonstration experiment.

However, the demonstration experiment described has wider implications than simply creating better electronic solutions for blind and weak-sighted users. The experiment also illustrates the importance of facilitating interaction between different stakeholders in the process of developing new technology. Too often different stakeholders, latent or

explicit, do not have their say in development processes with important consequences. In technology policy making it is therefore important to create arenas where stakeholders both learn how to express their needs and have their say. In other words, the bazaar-route is important in creating more hot technology policy making.

References

Akrich, M. & Latour, B. 1992. 'A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies'. In Bijker, W. E. & Law, J. (eds) *Shaping Technology/Building Society.* Cambridge, MA: The MIT Press. 259-264

Callon, M. 1998. 'An essay on framing and overflowing: economic externalities revisited by sociology', in Callon, M. (ed.) *The Laws of the Markets*. Oxford: Blackwell. 244-269.

Callon, M. 1987. 'Society in the making: the study of technology as a tool for sociological analysis.' In Bijker, W., Hughes, P.H & Pinch, T. (eds) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge: The MIT Press. 83-103.

Cook, T. D. & D. T. Campbell 1979. *Quasi-Experimentation. Design & Analysis Issues for Field Settings*. Boston: Houghton Mifflin Company.

Hetland, P. Forthcoming, 2002. *Unmasking the Net: when technology communication turns to the public.* Gøteborg: Nordicom.

Hetland, P. 2001. 'The three faces of the Net: Internet narratives'. Paper presented at *Computers at the Crossroads: Information society and beyond.* Trondheim: NTNU.

Hetland, Per 1996a. *Exploring Hybrid Communities: Telecommunications on Trial*. Oslo: Department of Media and Communication. Report no. 29. (Ph.D. dissertation.)

Hetland, P. 1996b. *Internett som inngangsport til offentlig informasjon*. Elverum: Hedmark College. Report no. 5.

Hofmann, J. 1995. 'Writers, texts and writing acts – constructed realities in word processing software.' *The Mutual Shaping of Gender and Technology*, University of Twente: conference paper.

Tyner, K. 1998. *Literacy in a Digital World*. Mahwah NJ: Lawrence Erlbaum.

Woolgar, S. 1991. 'Configuring the user: the case of usability trials.' In Law, J. (ed.) *A Sociology of Monsters. Essays in Power, Technology and Domination*. London: Routledge. 57-99.

Woolgar, S. 1994. 'Rethinking requirements analysis: some implications of recent research into producer-consumer relationships in IT development.' In Jirotka, M. & J. Goguen, A. (eds) *Requirements Engineering: Social and Technical Issues*. London: Academic Press, Harcourt Brace & Company. 201-216.

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[2] Cook and Campbell use the notion of quasi-experiment for experimental situations in which the experimenter cannot manipulate human behaviour. See Cook and Campbell (1979).