Draft notes for paper presented at Design and Consumption: ideas at the interface, a workshop held at Durham University, UK, 12th-13th January 2005.

Barend van der Meulen

Designing ambient intelligence: from use to practice; from users to networks

Barend van der Meulen; University of Twente; b.j.r.vanderMeulen@utwente.nl

My starting point is the field of STS (science, technology and society) and the notion of co-evolution of technology and society. Technology, technological artefacts are to be seen as part of society and society cannot be understood without its technological dimensions. This is an accomplishment as such compared to traditional theories of technological development and of sociology. But by now we have to see it as a starting point and move forward. One aspect which is still poorly understood is how modern societies (reflexively) govern technological development.

STS emphasises the contingency of socio-technological developments. At the same time modern, society has many practices at which new technologies are "planned" as it were. Product design is only one of them. Other typical examples are laboratories for engineering research, research programmes, technological strategies of firms, governmental technology policy, technology assessment procedures, etc. Though some of these practices are inspired by findings of STS – a notable field is that of sustainable technology – there is a clear tension between the suggestion of 'governability' of technologies and the contingency claimed by STS studies. How to understand these practices of technology planning?

Note: I use the word planning deliberately, though I know most of the practitioners would deny that they plan, or even able to plan. But I would like to foreground the managerial aspects of these practices that can only be successful by the illusion of planning.

Product design

Recently I have been involved in courses for product design. As part of the Master curriculum, first students had to draw different scenarios for 2015, for a field they could choose to their own interests. The scenarios were based on methodologies from future studies, but theoretically were using insights from STS. In the second part of the course students had to design a future product for one of these scenario's or a product that could live in all scenarios. A restriction for the students was that the products had to include flexible solar cells for energy delivery. Note that even the student groups that were most optimistic about the future capacity of flexible solar cells had to cope with their limited technological energy performances. Though STS claims that the material aspects of society should be included in social

theory, in their own theories of technological development they tend to forget about the constraints the material dimensions of society imply.

However, I am interested also in what these product designs do and on what aspects these students focussed. Looking closely at the work, the step from the scenarios to the product design reveals how designers create the circumstances by which they can design. The step from future scenarios to future products is more than a step from macro to micro, or even more than a step from socio-technical landscapes to technological niches. The scenarios focus merely on the societies or sectors as social phenomena. "Agriculture" will be affected in different ways by forces of globalisation, sustainability, consumer power, europeanisation, food regulation, genetic modification, and the like. The product designs show little of these forces: they show technical specifications for the solar cells, sizes, operations, technical functions, materials and even choices of colours. People seem to be vanished. Society seem to be put outside. Only in a few case we see individual users carrying the product, or using it as lonely consumers.

In a way the designers create through the design their own laboratory in which they can control the circumstances and make a product that functions. But laboratories are strange places as we know from science studies. They have their own logics and create results related to the laboratory. Replication within other laboratories may be difficult or even impossible (in cases of Big Science) and the result is not simply "knowledge about reality". But knowledge constructs very much connected to the circumstances by which it was created. We can find similar patterns in fields of science were the laboratory is absent. We know by know that knowledge use is a wrong term. The knowledge, once outside the laboratory and outside the protected practices of 'Science' will not simply be used, but embedded in other practices in which "reality" does not really matter. What about the use of products?

Material dimensions of society

The material dimension of technologies has further consequences. Do artefacts have politics? The STS correct answer is yes, and the empirical support is Langdon Winners account of the Long Island bridges. The bridges would be to low for the public busses and by implication deny the poor, black people of New York access to the beaches of Long Island. There is much more to say about the example. His text however moves on by emphasising the importance of recognizing the politics of technology and he suggests that some technologies are more democratic than others. Nuclear power plants are not democratic he claims, because they can only be safe under authoritative governments. Current evidence suggest otherwise: Authoritative governments have been very unsuccessful in creating safe, good functioning nuclear power stations, while within democratic countries nuclear plants can be operated safely. (So it seems, and if we accept the neglect of the nuclear waste problem.)

Still I would claim that Winner points to an important aspect: technologies, technological artefacts create new social structures. In my courses on technology in society I use a different example – also referring to a bridge. An awkward, spine-

shivering example. The *Pont Rouge* in the City of Luxembourg. The bridge was built in the sixties as a solution to the traffic problems in lower neighbourhoods (lower as they are build in a valley) of Luxembourg. It crosses not just a river, but a valley and some of neighbourhoods in that valley. At the end of the sixties the bridge was opened by Luxembourg's Grand Duchy. The bridge showed that Luxembourg was at the technological frontier at par with other modern nations, so he claimed. In the years after it became clear that the bridge was much more than a solution to a traffic problem and a sign of technological progress. It became a place of suicide. And much to the horror of the inhabitants their bodies fell into lower neighbourhoods. At the street, at roofs and at plays grounds. Three to four times a year, at the frequency and with an impact that it became part of the community life.

The bridge was planned. At the design tables and probably in the modernistic, engineering modes that Thomas Hughes reveal for some of the large technological projects in the US. In a cynical tone one could claim that users had given an new, own interpretation to the bridge. But that would focus only on those committing suicide. What was created was a new practice – a practice of suicide which involved not just those that jumped from the bridge (and those that were said to pushed of), but also and maybe even more so those living under the bridge. These people living under the bridge were not using it. They were not against the bridge. They were no NIMBYs. But more than anyone else they were experiencing the unintended consequences of the bridge. A new practice, but not one planned. A new practice that institutionalised so quickly in the Luxembourgian society, that it took more than twenty years and a movie from outside to make the government consider it as a problem.

Ambient Intelligence.

Much of the current research in ICT (in the Netherlands) is inspired by the idea of Ambient Intelligence, or Ubiquitous Intelligence or Ubiquitous Computing. There are several concepts, but with the same vision to replace current ICT infrastructures and applications, which work only if they are literally at hand, with ICT infrastructures and applications that operate in the background and serve the user without direct interventions of the user.

'It's fun and the time is ripe. It's going to take off!' Paul Havinga is convinced that information technology will soon be far more invisible in our surroundings. Lots of intelligence will be hidden behind the wallpaper and in equipment that is in daily use. Not the kind of equipment for which you need a keyboard or a pocket computer to operate – 'that's much too technical' – but rather equipment that can be operated in a natural, automatic way. Small appliances that are around us and that work together." (interview at the website of the university's research institute for ICT research)

Research concentrates on the development of systems and their components as on specific applications. The vision of ambient intelligence implies that ICT networks

and applications are build around the user and will adapt to the "normal behavior and way of interaction" of the user. And indeed in publications, websites, etc. we see either graphics and descriptions of the ubiquitous information systems or of users surrounded by applications that are at his/her disposal at any time, at any place.

The contrast is striking and interesting. While the ICT is (rightly) depicted as a (wireless) system of interconnected devices, components and artifacts (Figure 1), the user is a lonely user within this network. (Figure 2)[1] We find a practice of planning of technology in which the new products are de-socialized.

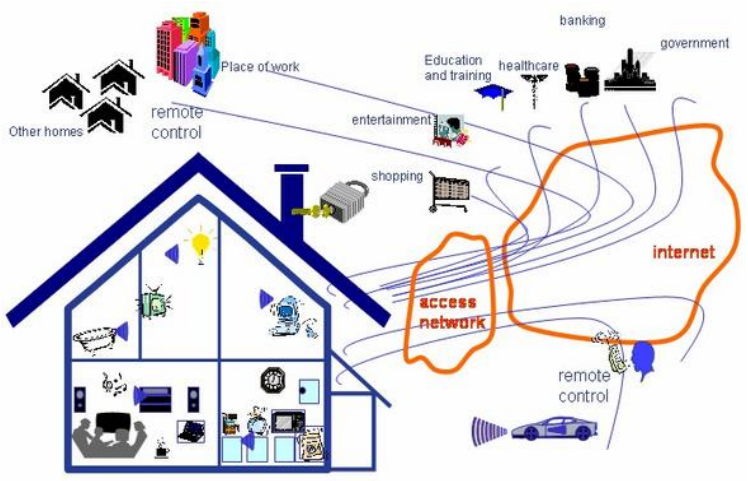

Figure 1: CTIT website, research program; Building Blocks for Ubiquitous Computing and Communication (U-BRICKS)

Figure 2: From CTIT website Program on e-Health.

[1] See also the scenario studies of IPTS on ambient intelligent which have individual users as a focus and workshop report of the Workshop Ambient Intelligence: In the Service of Man (sic!) ?

However current impacts of ICT are not only on the level of individual users, but also on groups, organizations, relationships between actors, society etc. Users operate in social networks and applications should not be designed to optimize user experiences as such but social network experiences. The e-health applications are a case in point. The patient is not a patient as such, but his/her identity as a patient is related to his/her relation with the medical profession, and in case of severe and chronic diseases, also in relation to family, friends etc.
Patient organizations may be important as well, and from an actor-network theory perspective the whole medical infrastructure, which allows the patient to interpret the data and take action (take medicines) when appropriate, should be taken into account. In other words: in many cases the user will not be an individual user but a network(ed) user. Instead of user-oriented design methods one should develop use-oriented design methods or users-oriented design methods, emphasizing the different user positions, roles and interests.

The consequences of the network character are analyzed for implementation and governance of technologies, were in many sectors the difficulty to innovate is related to the alignment of heterogeneous actors into a innovation network. E.g. for Electronic Patient Dossiers research has made clear that implementation is not just a matter of well-known infrastructure and designing proper software, but also of re-organising patient-doctor, doctor-nurse and doctor-doctor relationships within the overall hospital configuration. Implementation of grand schemes of EPD ran aground on the impossibility to rearrange professional, clinical, commercial and patient relationships through managerial interventions. Instead, in the Utrecht region, implementation trajectories related to small niches of specific care relationships created learning trajectories from which larger applications could grown.

Though the dynamics behind major technological developments such as ambient technology can be described from a general perspective of niche development, regime transformation and changes of sociotechnical landscapes (Geels, 2001), the specific opportunities for niche creation and learning processes depend on characteristics of existing socio-technical regimes. For sustainable innovation four different innovation patterns have been distinguished by which socio-technical regimes can be transformed: supply-depended innovation pattern, user-driven innovation pattern; the mission-oriented innovation pattern and the R&D depended innovation pattern. But these patterns have not been translated into design strategies. (Van de Poel, 1998)

Discussion

The three observations are far from a systematic analysis, but they move around the tension between practices of technological development build upon the ideal of planning and creating societies, while at the same time they are unable grasp the sociality of technologies. That is one side of the tension. The other side is the tension in STS between the sociality of the technological developments and the

contingency of outcomes while the materiality of technology and technological planning practices are much more constraining than STS seem to accept.