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The rise and fall of self-service in Amsterdam trams: user–technology relations in a case of service innovation

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The stabilisation of innovative technology depends on reconciling technological opportunities and user behaviour. This can be achieved by adjusting the technology to the users, by configuring the user, or by a combination thereof. This paper evaluates different strategies in a case of service innovation: the substitution of conductors with self-service machines in the Amsterdam tramways around 1970 and the various forms of fare-dodging that came along. To counteract fare-dodging, the transport company unsuccessfully relied on a strategy to configure users. Alternative strategies, notably configuring users through technological adjustment, are suggested to increase the chance of stabilisation. These observations and suggestions are related to the actual characteristics of services: given that transport services are immediately and collectively used, their misuse, if not corrected by fellow passengers, soon tends to threaten the aspect of stability. Emphasising service characteristics thus contributes to a better understanding of strategies to reconcile services and users.

Keywords: innovation; services; public transport; users; domestication

Introduction

Since the early 1990s much attention has been paid to the role of users in technological innovation. Important insights about the co-construction of technology and its users, the mechanisms of stabilisation, and the opportunities for learning are gained from a large variety of case studies (Coombs et al. 2001; Oudshoorn and Pinch 2003; Stewart and Williams 2005). This paper explores the relevance of such insights for understanding stabilisation in service innovation. It assumes that such stabilisation – the achievement of consensus about the functionality and meaning of the innovated service – requires mutual adjustments of innovation and users (Leonard-Barton 1988). On the one hand, innovation requires that users learn about the opportunities of new technology and services. On the other hand, the choices of designers and innovators may have already been

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formed by ideas about and feedback from users, and this information is then used to align the service system with the wishes and capacities of its future users. To understand how fulfilling these requirements contribute to the stabilisation of systems we develop a conceptual framework and apply this to a case of service innovation.

Although service innovation, especially in capital-intensive services, is often technology-based – either the introduction of new technology or a different use of existing technology (Barras 1986; Gallouj 1998; Hauknes 1998) – there are several differences that have seldom been properly thought through in technology and innovation studies (Sundbo and Gallouj 1998). Service innovation differs from technological innovation in a number of important respects. First, services cannot be stocked, which means that the production and consumption of services often coincide (Gallouj and Weinstein 1997; Miles et al. 1986; Sundbo and Gallouj 1998). Consequently, divergence from the meaning attached to technology between innovator and users constitutes a direct threat. Strategies to reconcile technological systems with users' wishes and capacities are thus particularly urgent in the case of services. Second, technology is sometimes collectively used in services, especially in standardised services (Sundbo 1998). Collective use puts different requirements on the technology: its functionality should be broad or flexible enough to cover the range of wishes and capacities of users. Conversely, users should (learn to) accept that technological choices are often compromises between different characterisations of users. This condition complicates the alignment of technology and users. Finally, in the case of public services a third important characteristic should be acknowledged: innovations should be in the interests of the public (Nahuis 2007). Decisions are therefore often subjected to public debates and political control, particularly when governmental bodies provide these services. Politicians, consumer organisations and other stakeholders look upon the interests of users and citizens in decisions about the future of these services.

These three characteristics are present in many innovations in the domain of public transport, such as chip cards for public transport, bicycle pools, terminals to change from car to public transport, car sharing and company-organised collective transport (e.g. Bos 2002; Hansen 2002; Hoogma et al. 2002; Van Zuylen 2000). We selected a case study from the field of public transport because innovations in this field often require considerable behavioural modification of the passengers who are encouraged to reconsider the organisation of trips and their daily routines. This case, the introduction of self-service in the Amsterdam tramways around 1970, involves a considerable change in the relation between the technical system and user behaviour, and last but not least the need to resist fare dodging. We will see how stamping machines seduced the Amsterdam Municipal Transport Company (GVB) to save on expensive labour. We will then focus on the emergence of fare dodging. How did the GVB cope with this threat? The conclusions evaluate the strengths and weaknesses of this coping strategy compared with alternative strategies and explore how the specificity of (public transport) services affects such coping strategies.

This research, on the one hand, aims to contribute to the sociology and history of transport technology. Although historians and sociologists have contributed a great deal to our understanding of the dynamics of transitions of transport systems (e.g. Filarski 2004; Grübler 1990), only few of these studies delve into the details of user–technology relations (e.g. Den Hertog et al. 1996; Hoogma et al. 2002). Technology studies about the dynamics of self-service innovation in public transport, however, are absent to my knowledge.[1]

On the other hand, the research contributes to a literature about service management. Researchers in this field have paid more attention to the relation between users and self-service technology (e.g. Bobbitt and Dabholkar 2001; Curran 2003; Dabholkar 1996; Dabholkar and Bagozzi 2002; Lee and Allaway 2002; Meuter et al. 2003; Selnes and Hansen 2001).

However, because this research mainly focuses on intentions, expectations and attitudes instead of on actual behaviour, the tension and friction that becomes manifest in the actual use of technology remain underemphasised. This study adopts a much less static conceptual framework. By following the self-service technology in action it becomes possible to gain a better understanding into the actual behaviour of users and the subsequent responses of innovators.

The stabilisation of user-technology relations

Innovation is a difficult and fragile process. Many ideas never reach maturity. In evolutionary terms: some variations survive, whereas most of them die out. One reason is that users do not always react as expected (e.g. Flyvbjerg, Skamris Holm, and Buhl 2005). During the innovation process all kinds of assumptions are made about who the users are, what they want and what they are able to do, but when technologies are actually put into use, and exposed to real life conditions, often such assumptions appear to be wrong. There is no single typical user that can be addressed easily. Users are a mixed bag of motives, aspirations, skills and competences. It appears to be a very complex process to reconcile an innovative product with this heterogeneity (e.g. Akrich 1992; 1995; Gjøen and Hård 2002; Woolgar 1991). This section discusses three concepts taken from the literature about user–technology relations to conceptualise the implications of heterogeneity: 'domestication', 'configuring the user', and 'adjusting the technology'. Based thereon, three strategies are proposed that innovators can employ to achieve stabilisation.

(1) *Domestication.* Because there are different varieties of users, users also domesticate technology in a variety of ways (Lie and Sørensen 1996; Silverstone and Hirsch 1992). Domestication refers to the way users incorporate new technological products in their daily lives. Often, domestication reflects the intentions of designers but this cannot be taken for granted. Objects do not necessarily keep their original function. They may become functional in ways somewhat, or even entirely, removed from the original intentions of the designers.

Domestication can have stabilising or destabilising effects. With stabilisation we mean that consensus is achieved about the functionality and meaning of the technology. Domestication can contribute to stabilisation, which is often the case with successful network technologies. The more people use it, the more value it has to newcomers and the more profitable it becomes to invest in infrastructures or content. The domestication of the telephone is a telling example. Although the telephone was primarily developed for formal business purposes, its diffusion in the early twentieth century was rather due to its domestication in the household of women who used it as a means to organise their everyday life, to maintain social relationships and to overcome the boredom of rural life (Fischer 1992).

Domestication can also have destabilising effects. This happens when different meanings that user groups attach to technology cause untenable pressures. White bicycle pools (bicycles owned cooperatively), for instance, destabilised because of domestication. Not all users shared the idea of common ownership and the bicycles were either appropriated by self-interested users or spoiled by users who did not care about maintenance (Benedict 2002).

Domestication can both contribute to stabilisation and threaten the stability of the service. In the latter case two different strategies are available to innovators: innovators can either configure the user or adjust the technology. Both strategies enable them to cope with the variety of users.

(2) *Configuring the user.* Configuring the user is a matter of correcting deviant user behaviour. According to Woolgar configuring the user means: 'defining the identity of putative users, and setting constraints upon their likely future actions' (Woolgar 1991, 59). If technological development is not justified by user requirements but rather by technological opportunities, then designers tend to impose their vision of the future on users by determining how the technology should be used. Whether all users indeed rightly use the machine, however, depends on the power to configure the user: the constraining, obstruction and redirection of users. Warnings, error messages and manuals were important means of user configuration in Woolgar's case of a microcomputer development. Users wishing to open the machine were faced with a sticker: 'Warranty void if this seal is broken'. Users who were not sure how to fix a hard disk upgrade were redirected to their 'user documentation' or the 'technical support hotline on 0898-239239'. Woolgar shows how 'the user' is defined by a particular conception of proper use, by constraining user behaviour that deviates from such use, and by redirecting users towards such proper use. Configuring the user thus involves adapting the user to the technology through efforts of constraining and redirecting.

(3) *Adjusting the technology.* The third concept, adjusting the technology, is based on assessments of the ways in which different users handle technology in different situations. Akrich has shown how designers try to generate representations of users: statements or stories about what users want and do in specific situations (Akrich 1995). Innovators consult experts in the field of user behaviour, compare their design with similar products, organise experiments, or use feedback from experience. Having assessed the variety of users and circumstances, designers are challenged to make the technology accessible and functional to as many different users as possible. They can, for example, design technology in such a way that it meets all the requirements of heterogeneous users. This design strategy yields 'one technology for all', but may result in highly complex and difficult interfaces. Ticket vending machines on Dutch railway stations are typical outcomes of this design strategy. These machines[2] cover the needs of various users: users who need a ticket for bus, train or train taxi; users heading for X or users heading for Y; users with a discount card or users without; users with cash money and users with a bank card, etc. However, to avoid the need for complex interfaces designers can also build flexible technology or merely components and delegate the specification of functionality to intermediaries, who are able to translate personal preferences into technological choices. This happens when a computer shop composes and configures a personal computer on demand, or when a travel agency arranges an all-inclusive three-week trip to a holiday destination.

Concepts found in the literature about users offer useful insights into the different mechanisms of alignment and stabilisation. This raises an important question for strategic management: how can these mechanisms be intentionally directed? Whether innovation leads to stabilisation depends first and foremost on the way it is domesticated by different users. If this happens in accordance with the purposes of the innovator, then it will contribute to the stabilisation of the system. The first strategy for innovators is thus to facilitate the stabilising effects of domestication. If, on the contrary, domestication threatens stabilisation, two other strategies remain: configuring the user or adjusting the technology.[3] However, it is not always predictable how users react to these strategies. How will they domesticate the innovation in the new situation? Will this indeed lead to stabilisation or will destabilising tendencies urge another intervention? With hindsight it is possible to reconstruct how innovators (do not) succeed to achieve stabilisation by means of different strategies.

In the next section we focus on the introduction of self-service in the Amsterdam tramways around 1970, in particular the most important threat to the stabilisation of the system: fare dodging.

We explore which strategies the Municipal Transport Company of Amsterdam employed to cope with this threat. In the conclusions we discuss this strategy in the light of the range of other possible strategies suggested by the literature.

The case study is mainly performed on the basis of articles from different newspapers in the period 1965–1975 collected by the Municipal Archives of Amsterdam. These articles include accounts of press releases and press conferences, comments, journalist observations and interviews with GVB spokespersons and ticket inspectors. These data are supplemented with the minutes of those City Council meetings where aspects of self-service were on the agenda. Finally, information is derived from a small number of books and reports that discuss this particular episode in the history of the GVB.

The case of self-service in the tram (1965–1975)

Introduction

The tram has been one of the main transport modes through the narrow streets of Amsterdam, the Netherlands, since the end of the nineteenth century. In the late 1960s the Municipal Transport Company Amsterdam (GVB) operated about 220 trams on 27 lines, both old ones with separate motor wagons and trailers and newer articulated ones (Korthals Altes 1999). These trams were manned by about 430 conductors[4] who walked through the tram and checked the tickets of passengers or sold tickets to those who had not bought one in advance. These conductors, however, increasingly burdened the company's annual budgets, especially in the light of experiments with self-service elsewhere in Europe.[5]

At a press conference in July 1965 deputy director Van der Vos of the Municipal Transport Company (GVB) announced plans to introduce self-service in Amsterdam trams. The GVB had studied this plan for a while. He gave two reasons: to save scarce and expensive labour and to provide faster service. The GVB decided to start an experiment with a few trams painted in distinctive colours, equipped with buttons to operate the doors and with smart doorsteps that prevented the doors from closing as long as people were entering the tram.[6] More important, there was no conductor in the motor wagon anymore. People with a transfer or season ticket were allowed to enter this motor wagon; people without a valid ticket were obliged to buy one from the conductor in the trailer. No stamping machines were installed as yet.[7]

The GVB had organised a name contest to familiarise the public with the self-service trams. The prize-winning name represents the general expectation: 'The Thieves Wagon'. The GVB reacted indignantly,[8] but many other suggestions also referred to the probable abuse of the system.[9] In a newspaper from 1967 a reader ironically comments: 'Travelling without a ticket has been a local sport for ages. It is a shame to deprive the people from this enjoyment. Removing conductors from the trams is totally irresponsible. It is like removing the goalkeeper from a soccer game.'[10] In the first week about 2% of the passengers indeed dodged fares, but this percentage decreased to one in the next weeks. Deputy director Van der Vos satisfactorily concluded that the second percent had been due to ignorance. He was not at all worried about the remaining 1%.[11] (No wonder that the percentage was not higher, Korthals Altes (1999) comments: the bulk of passengers on the experimental line 27 were season-ticket holders.) After two months, the GVB was still satisfied. Also technically the system functioned properly. Van der Vos: 'Of course the City Council has to decide. But if you look at line 27, then the only possible conclusion is to extend the self-service system.'[12]

The decision-making authorities shared this conclusion. The City Council of Amsterdam (1968b) agreed to place credit at the disposal of the GVB in order to introduce self-service

on line 1 and 2. It was planned that, if the experiment were successful, self-service would then be introduced on all trams within a period of four years. The annual savings were thought to amount to half the investment costs. The council discussed how the several tasks of the conductors should be reorganised. Four tasks were considered.[13]

First, in order to serve foreigners and people who only occasionally travelled by tram, the driver was going to sell single tickets. Second, the sale of multi-journey tickets was delegated to sales addresses (about 500) and ticket-vending machines were to be placed on strategic locations along the routes. Third, the task of stamping the tickets was delegated to stamping machines inside the tram, which the GVB claimed was the 'generally accepted solution'. Finally, the task of controlling all passengers was discontinued. Total control was replaced by methods of random control by newly employed ticket inspectors. In addition to the redistribution of the conductor's tasks, the GVB should pay attention to educating and familiarising the public. Particular emphasis should be placed on the advantages of using one of the different kinds of season tickets. These did not need to be stamped.

One year after this council meeting it appeared that the delivery times of machines were much longer than expected and the first phase would not start until March 1969, but because the 1969 budget of the GVB again showed huge deficits, the City Council agreed not to wait for the results of the first phase and decided to grant a subsidy for the automation of the rest of the tramways as soon as possible. According to the Mayor and Aldermen the foreign experiments had already provided enough good experience with self-service. The City Council (1969) agreed. All trams were gradually equipped with stamping machines and the tram stops with vending machines and manuals (see Figures 1 and 2).[14]

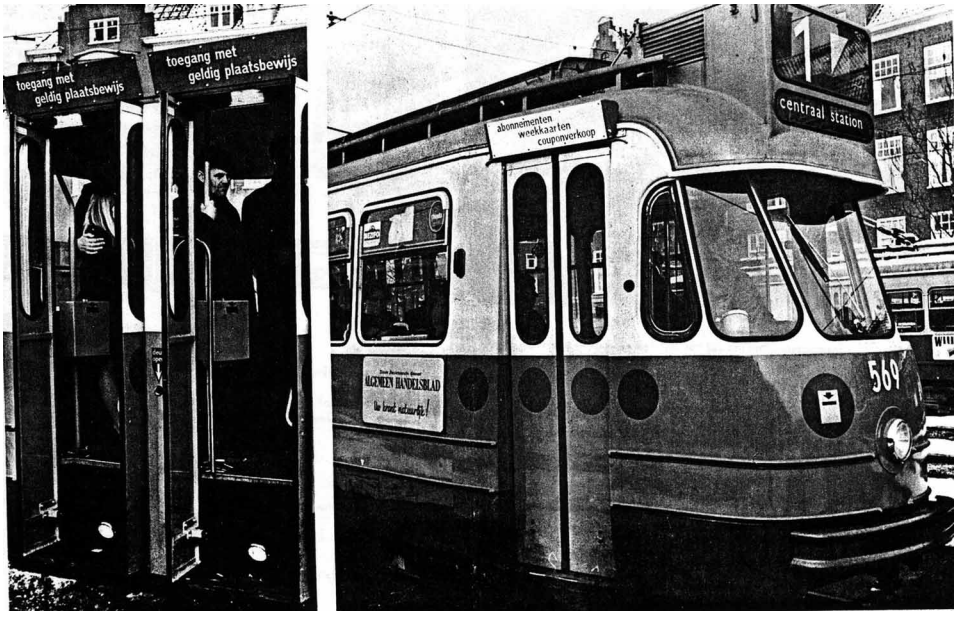
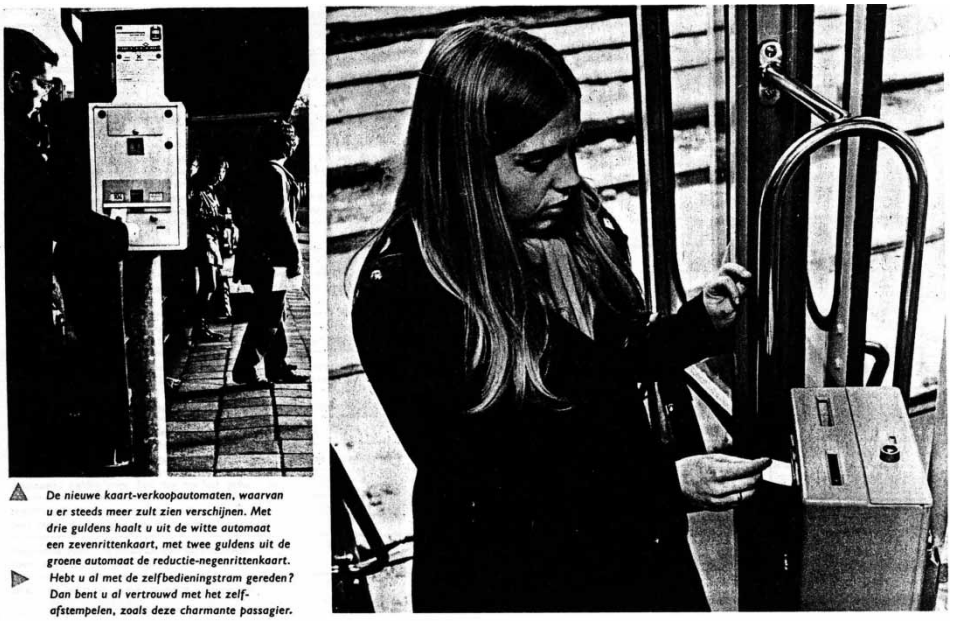


Figure 1. Self-service on line 1.



De nieuwe kaart-verkoopautomaten, waarvan u er steeds meer zult zien verschijnen. Met drie guldens haalt u uit de witte automaat een zevenrittenkaart, met twee guldens uit de groene automaat de reductie-negenrittenkaart.

Hebt u al met de zelfbedieningstram gereden? Dan bent u al vertrouwd met het zelf-afstempelen, zoals deze charmante passagier.

Figure 2. Ticket vending and stamping machines.

Fare dodging: the emergence of a phenomenon

Fare dodging was an issue at the centre of debates about self-service from the very beginning.[15] Based on experiences in Cologne, Frankfurt and Stuttgart, the board of directors of the GVB argued that fare dodging would not cause major problems: between 0.03 and 0.3% of German passengers dodged fares, depending on the method of inspection. Another lesson learned from the German experiments was that labour saving would be in the range of 60–80%. A small number of former conductors would be needed as inspectors.[16]

Although saving expenses had been one of the main reasons to introduce self-service, the main attention given to fare dodging should not merely be interpreted in terms of income deprivation. Rather, fare dodging constituted a threat to the stabilisation of the whole system. The system presupposed self-discipline. If large numbers of passengers did not appreciate and incorporate this 'virtue', the very foundation of the concept would fall apart.

Fare dodging hardly existed until 1967. The task of inspection was combined with the sale of tickets when the conductor walked through the tram. In a formal sense it did not exist at all until 1967: a ruling of extra payment in the event of fare dodging was not included in the regulations and tariffs of the GVB. People suspected of fare dodging only had to pay the normal price (in Dutch guilders – NLG0.50; approx. US$0.15 in those days). In order for self-service to succeed, this omission had to be corrected. In 1967, the City Council (1967) agreed to include a new article in the regulations to the effect that passengers without a valid ticket were indebted to pay NLG1.00 for the trip, increased with the amount of NLG0.50 for extra administration expenses. Fare dodgers risked having to pay NLG1.50, whereas a ticket cost only NLG0.50. Not being caught on three trips meant making a profit. In other words, the GVB relied heavily on the honesty of their customers. Many people, however, believed that abuse might become as regular as honesty, as could be learned from the name competition.

In 1968, just before the first phase of introduction, the NLG1.50 fine was raised to NLG2.50. New director Ossewaarde still found this too low. In Germany the fines amounted up to 20 times as much.[17] Meanwhile the City Council had also changed the Local Ordinance in order to authorise controllers to make reports of offences. The maximum punishment in case of refusal was now determined at two weeks in prison or a penalty of NLG300 (City Council 1968a).

In the early days the GVB continually designed inspection strategies. Uniformed inspectors entered the tram at a random stop, stayed until the second or third stop, left the tram and moved on to another one. The company promoted the element of discipline through the 'omnipresence' of inspectors.[18] In 1970, again a new strategy was introduced. Two inspectors entered the tram at the same time: one at the front, the other at the rear. The one inspector caught the person trying to escape the other one.[19] The result of this approach was that people ran to the stamping machines and then quickly stamped their tickets. According to an inspector, 'the sound sometimes resembled a machine gun'. As a counterstrategy, the GVB dressed the rear door inspector in civilian clothes and he was to catch these runners.[20]

The GVB employed its power to normalise honesty with varying success. So-called gamblers, who calculated the cost of tickets and fines against the chance of being caught, were the easiest to deal with.[21] GVB director Ossewaarde said in 1969: 'They pay their fine without resistance. They already have NLG2.50 in their hands. They gamble and have bad luck.'[22] Far more difficult were fare dodgers heading for the Vondelpark. Especially in summertime hippies travelled on these trams. 'To them, paying isn't an issue at all', an inspector complained.[23] Another category of fare dodgers was people who claimed to be unfamiliar with the system, in spite of the instruction placards. According to Ossewaarde, some fare dodgers even pretended to be foreigners and explained, in perfect German, not to know how the system worked.[24]

The GVB monitored the occurrence of fare dodging. Inspectors collected data and passed it on to the department of statistics and economy.[25] In 1972 – meanwhile all trams had been equipped with stamping machines – the number of fare dodgers was estimated at about 350,000 against 220,000 the year before. The GVB declared that they were not worried. A spokesman said: 'Because there are many people with a season or transfer ticket, one might get the wrong impression that passengers excessively dodge fares. In reality, the number still does not exceed one percent of the total number of passengers.'[26]

In spite of the spokesman's reassurance, the growth of the phenomenon did indeed worry the GVB. In 1973 the fine was raised from NLG2.50 to NLG5.00.[27] Meanwhile, 84 inspectors were employed to perform random checks at all hours of the day,[28] but even these measures failed to prevent the number of fare dodgers from increasing. In 1974, an investigation showed that fare dodging amounted to between 2.9 and 3.3%, with a reliability of 99%. The investigators estimated the yearly loss at NLG2 million, which was about 40% of the estimated savings through self-service. Peculiarly, the biggest group of fare dodgers were foreigners (30%). The investigators imputed the occurrence of fare dodging (still) mainly to ignorance. They recommended improving the information on the ticket and stamping machines.[29]

In the years to come, the percentage of fare dodgers would, however, rise to problematic heights (up to 5% in 1979) (Cocov 1979), and not because of tourism. The system gradually started to destabilise with the rise also in vandalism and violence. Regular breakdowns of the ticket machines were caused by criminal offences, which became ever more conspicuous. The ticket-vending machines in particular were often subject to vandalism because they contained money, but vandals entered the scene in other respects as well. They put chewing gum into the ticket-stamping machines, others tried to buy tickets using foreign coins, seats were regularly damaged and pick-pocketing raised questions about security (Cocov 1980; Freeke 1990). The

tram appeared to be an easy, unrestrained, little-monitored domain for different sorts of offences. In 1977 city councillor Meijer pleaded for the return of conductors: 'The number of fare dodgers has grown enormously, ticket sales do not function, the service to the public has vanished, pick-pocketing and theft are a matter of course.'[30] Around 1980 a number of studies were performed to investigate these trends (Cocov 1979) and the possible comeback of conductors (Cocov 1980). Not until 1991, when the number of fare-dodgers had increased to somewhere between 13% and 33%, was this comeback actually realised (Van der Gragt 1997; Visser 2000).

Configuring the responsible passenger

Assumptions about users are verified in experiments: it becomes clear to what extent users imagined by designers indeed resemble real users (Akrich 1995; Woolgar 1991). The GVB only performed a minimal experiment before gradually introducing self-service on the whole tram network. The verification of assumptions was thus part of the implementation process in real life conditions. The GVB carefully monitored the actual situation. It observed how users domesticated the machines and the accompanying norms, values and meanings and adjusted its coping strategies on the base of these observations.

Some users incorporate an innovation in ways far removed from the intentions of its designers (Fischer 1992). The emergence of fare dodging is a telling example. Fare dodgers incorporated other values than the GVB intended to pass on, but domestication varied with the kind of fare dodger. Hippies, who believed that public transport should be free of charge, attached different meanings and values to self-service, to morality and to law, than calculators who respected the law but not the underlying morality, and again these groups differed from ignorant foreigners. Hippies turned their refusal to pay into a political statement. 'The fine of NLG1.50 is outrageous', one of them stated in 1967.[31] Coping with these separate groups of fare dodgers obviously called for different strategies. (Amazingly no study about the character and motives of fare dodgers was performed until 1981 – see Veldkamp Marktonderzoek (1981).)

Focusing on the issue of fare dodging draws the attention to the strategies to configure the tram passenger. The GVB started with the assumption that 'the user' was a responsible passenger, taking care of his own ticket. The company initially relied on the power of morality. This assumption was formalised with the adjustment of the Local Ordinance, which treated the distinction between a fare payer and a fare dodger in terms of legal/illegal. Laws were added to morality. The GVB employed a number of controllers, aiming to normalise this responsibility and correct deviant behaviour. Control was added to laws and morality. The first control strategy assumed that the mere presence of controllers would foster obedience. However, users quickly ran to the stamping machines to stamp their tickets. A new strategy was adopted with the rear door inspectors dressed in civilian cloths. This strategy was added to control, laws and morality. The GVB continually increased its efforts to configure the tram passenger.

Despite these efforts, however, the self-service system never really stabilised or, more precisely, it stabilised in the short run but not in the long run. The growth of the phenomenon of fare dodging continued. In 1972 the number grew from 220,000 to considerably beyond 300,000. One last attempt to preserve the stability of the system is very peculiar. A GVB spokesman warned against 'wrong impressions' and estimated that the amount involved was still not even 1%.[32] He blamed the situation, which was not what it seemed. Nevertheless, 1% was much higher than the 0.03% to 0.3% seen in German cities and, more alarming still, the percentage had begun to increase, partly because of the GVB itself. The company stimulated the sale of different kinds of season tickets, thus freeing passengers from the obligation to stamp their tickets, in order to eliminate

queues and improve service as a whole.[33] After a special discount offer in 1971, a total of 30,000 passengers (15%) held a season ticket.[34] However, this also meant that many people entered the tram without stamping a ticket and potential fare-dodgers saw an open opportunity to do the same. During peak hours, about 80% of all passengers travelled with a season ticket. Freeke states with hindsight: 'The appearance that nobody paid certainly seduced people to dodge fares' (Freeke 1990). Fare dodgers were no longer recognised among the large number of season-ticket holders. Their number increased from 3% in 1974 to somewhere between 13 and 33% in 1991. Because the system destabilised, conductors were gradually brought back on the Amsterdam trams. In 2006, 16 out of 19 tramways were manned with conductors.[35]

The management of alignment

Configuring the user means defining the identity of putative users and directing their future actions in relation to the technology. This is clearly what happened with regard to fare dodging. The case shows that the normalisation of use not only required moral appeals and legal reinforcement, but also the monitoring of deviant behaviour and the customisation of measurements to counteract such behaviour. Each new measure, and its media coverage, reconfirmed the normality of paying the fare. Each new strategy aimed at constraining deviant behaviour, of which many types existed. However, the mixed bag of attitudes, motives, and behaviours, varying in different circumstances, was too heterogeneous and the power of the GVB fell short in configuring all users into responsible self-serving passengers. Only with the comeback of conductors after 1991 was the user reconfigured again.

Theory suggested three different strategies. The GVB chose one of them, configuring the user, but failed to stabilise the self-service system. What would have been the implications of choosing another strategy? The company could have relied on the stabilising effects of domestication. It could have stimulated passengers to control one another, but social control would have required the stamping of tickets to be visible, so that user-inspectors could distinguish fare dodgers from season-ticket holders. This strategy was made impossible by the GVB itself, which had stimulated the sale of different kinds of season tickets. Holders of these tickets did not need to stamp them, the argument went, because that would increase the speed of entering and consequently improve the service as a whole. The company succeeded in its attempts, particularly through a special discount offer which led to 15% of the passengers being season-ticket holders. The spokesman, who tried to rectify 'wrong impressions' was powerless against this real impression: so many people entered the tram without stamping that fare dodging was simply not recognised by fellow passengers. On the contrary, it seemed normal not to stamp a ticket.

The second alternative strategy concerned adjusting the technological system to fare dodgers. One way to do so was to make public transport free of charge. Hippies had declared the self-service tram to be the first free ('white') tram.[36] Respecting their claim seems to be a very radical strategy to get rid of the problem of fare dodging. However, the idea was shared much more widely. When the Socialist Youth demonstrated for free public transport as a reaction to tariff increases, they were given a great deal of media coverage. Within three weeks 24 articles in newspapers were devoted to the demonstrations.[37] In 1970 one of the left wing parties proposed to the City Council to make the Amsterdam public transport free (City Council 1970). Experiments with free public transport in Bologna and other Italian cities had raised the discussion. Yet, of course, free public transport would have caused other problems. Although fare dodging would disappear it would not solve the emerging vandalism and aggression. In general, technology or services adjusted to users may give rise to new forms of domestication, which are sometimes hard to foresee.

A final alternative to stabilise innovation in services would involve a combination of different strategies. A less radical adjustment of the technology is imaginable, one in which passengers are obstructed to enter the tram unless they stamp a ticket. In effect, such adjustment of the technology involves configuring the user, though not via organisational measurements but via technological adjustments (Achterhuis 1995; Akrich 1992; Latour 1992). This combination of strategies would, for example, comprise small gates that could only be opened if one inserts a ticket. Or the 'smart doorstep' could have been designed to give an alarm signal when entering passengers did not put their tickets in the stamping machines. Such ideas are less radical forms of adjusting the technology than free public transport but, more importantly, forms that configure the user through technology. The effect would even have been reinforced had season-ticket holders been obliged to make use of the system too in order to foster stabilisation through domestication.

To conclude, a distinction between configuring the user and adjusting the technology is very helpful for understanding strategic responses to the destabilising threats of domestication. In a practical sense it also offers a means for evaluating adopted as well as alternative strategies, including combinations of strategies. Yet assessment of possible side effects remains necessary in any case; the concept of domestication appears to be useful for that purpose.

Users in service innovation

Theory serves to articulate how subtle technology, organisation and users co-evolve. It also draws attention to different strategies that enable innovators to stimulate the stabilisation of technological systems. This research shows that configuring the user is a possible strategy in the event that deviant behaviour undermines the very concept of the innovation. It also shows that configuring the user requires a significant repertoire of means and measures, but still can be dodged by the creativity and persistence of the users. This paper ends with three conclusions about the use of insights about user technology relations for innovation in services. These conclusions refer to the specific characteristics of public transport services: the coincidence of production and consumption, the collective use of technology and the public interest in decisions.

One consequence of the proximity between users and producers of innovative services is that configuring works in two directions. The GVB tried to configure the tram passenger. But there is more to say: the configuring efforts of the GVB were framed by the domestication efforts of fare dodgers. Measurements of the GVB not only resulted in a single definition of 'the user' as a responsible passenger, but also inspired some passengers to dodge these measures in a variety of ways. In turn, the GVB employed refined strategies to configure these creative dodgers. In other words, the GVB not only configured the user, but the company itself was also configured by its own organisation and by users. The GVB perceived itself more and more as a surveillance company rather than a company that provides a service. For service innovation in general this means that even a top–down strategy like configuring the user implies the mutual adaptation of users and the provider.

The second conclusion refers to collective use. Domestication of collective services shows different dynamics than individual domestication. The effects of learning and imitation should not be underestimated: passengers observed the (non-)use of stamping machines by other passengers; some learned how to dodge paying this way. 30,000 season-ticket holders may have caused 'wrong impressions' but they certainly encouraged fare dodging. The collective nature thus implies that imitation among users constitutes an important component of the domestication process. For the same reason, free public transport, as a solution to fare-dodging, would probably have failed to solve the problem of criminal offences. Pick-pocketing and vandalism should have been feared

even more. Presumptions like these necessitate a better understanding of the mimetic nature of domestication of innovations in collective services.

The third conclusion relates to the public nature and concerns the roles of the media and the City Council. Trams were part of the public transport system. Discussions, negotiations and configuring largely took place in the public realm. Experiences from users were fed back to the company via newspapers. The media were thus important vehicles for representatives of users, and conversely, representatives of the GVB also used the media. The heightening of fines, the increase of control and encouragement to purchase season tickets were all made public in press conferences. The media were thus important intermediaries between users and innovators, that is: important contributors to their mutual configuration.

By the same token, the City Council of Amsterdam was highly involved in the innovation process. It decided about finances, about tariffs, about the Local Ordinance. Each measure had to fit existing regulations. Each major decision was discussed at council meetings. The council, as both public transport authority and representative body of the citizens of Amsterdam, thus also contributed much to the mutual configuration of company and users. Therefore, a prerequisite for a proper debate on this level about the various interests is to disentangle the requirements for configuring the user and adjusting the technology in order to deliberately and comprehensibly assess the strategic possibilities at hand.

The framework developed and applied in this paper appears to be particularly useful for identifying the tensions and frictions between the prescribed uses of technology in services and the behaviour of the actual users. Such behaviour is only partially predictable. Innovating service companies therefore need to be aware of the contingencies of implementation and the need to solve unforeseen problems in a more or less *ad hoc* way. This study, however, also provides these companies with a certain amount of understanding of the opportunities and setbacks associated with three distinct innovation strategies. For example, they can configure users in a repressive or a constructive way. Too much emphasis on configuring the user, however, is likely to meet resistance, which may set in motion a chain of actions and reactions. The paper, finally, shows how such insights are relative to more general conditions of service provision. For example, because of these conditions service providers are directly confronted with the consequences of technology (mis)use. Emphasising these service characteristics therefore amounts to a better understanding of the dynamics of reconciling services and users.

Notes on contributor

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Notes

1. One exception is my own study about the politics of introducing self-service on the Amsterdam trams (Nahuis 2005). This study, however, is concerned with the democratic quality of the process and does not systematically explore the various modes of user–technology relationships and how these modes are related to the service characteristics of the case.
2. These machines are the successors of the vending machines featuring in the Amsterdam case below.
3. It should be noted that these concepts are not mutually exclusive. Configuring the user can occur via adjustments of the technology simply because the wishes of users are co-shaped by the opportunities and promises that come

along with innovative technology (Oudshoorn, Rommes, and Stienstra 2004; Pinch and Bijker 1987). Nevertheless, the emphasis on different objects of adjustment is useful for both theoretical and practical purposes.

4. *Trouw*, 17 Februari 1970.
5. *Volkskrant*, 27 July 1965. *Trouw*, 29 July 1965. Representatives of the GVB referred to a study about foreign experiments in a number of press conferences and City Council meetings. Although references abound, it remains doubtful whether the study exists in any written form. An extensive search in four different archives in Amsterdam, as well as personal communication with two then closely involved council members, turned up nothing. The study referred to was most probably an informal report of a study tour by the directors of the GVB.
6. *Nieuws van de Dag*, 8 August 1967.
7. *Het Parool*, 23 May 1967; *Nieuws van de Dag*, 25 July 1967.
8. *Het Parool*, 12 September 1967.
9. *Telegraaf*, 8 August 1967.
10. *Het Parool*, 1 July 1967.
11. *Nieuws van de Dag*, 8 November 1967.
12. *Nieuws van de Dag*, 8 November 1967.
13. A fifth task was not discussed. Conductors also provided information, both requested and unrequested. Newspaper commentators in particular considered the disappearance of unrequested information, often in strong Amsterdam dialect, a great loss.
14. The pictures are originally published in two bulletins called the *Nieuws van het GVB*, both from March 1969. The photographer is unknown. The pictures are reprinted with permission of the GVB.
15. E.g. *Volkskrant*, 27 July 1965.
16. Director Ybema in *Het Vrije Volk*, 25 July 1967. See also *Nieuws van de Dag*, 25 July 1967.
17. *Het Parool*, 12 March 1969.
18. *De Tijd*, 24 October 1968.
19. Ibid.
20. Ibid.
21. Ibid.
22. *Het Parool*, 16 September 1969.
23. Unknown source, approx. June 1972. *Nieuwe Rotterdamse Courant*, approx. June 1972.
24. *Het Parool*, 16 September 1969.
25. *Nieuwe Rotterdamse Courant*, approx. June 1972.
26. *Nieuwe Rotterdamse Courant*, approx. June 1972. Similarly quoted in *Het Parool*, 3 June 1972.
27. *NRC Handelsblad*, 22 June 1973.
28. *Nieuwe Rotterdamse Courant*, approx. June 1972.
29. *De Tijd*, 17 April 1974.
30. From a retrospect in *De Volkskrant* (22 January 1994).
31. Newspapers devoted a great deal of attention to the so-called Provos: left wing activists who viewed the system as a first step towards free public transport. Provo Hans Hofman travelled all day without ticket. 'I'll stay until I get a fine', he declared, while smoking one cigarette after the other. *Nieuws van de Dag*, 11 September 1967.
32. Duparc (2000) suspects the GVB of consequently having given wrong information: 'Estimations of the company hardly corresponded with reality.'
33. *Handels Transport Courant*, 25 May 1967.
34. *Het Parool*, 15 October 1971.
35. *GVB-Nieuws*, Summer 2002.
36. Local activist Hans Hofman, to a journalist. *Tijd Maasbode*, 11 September 1967. See also *Nieuws van de Dag*, 11 September 1967.
37. For example, *De Volkskrant*, 17 February 1969.

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