Consumers as innovative actors?

The role of users in the shaping of German GSM telephony

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Introduced in 1992 and planned well ahead, GSM telephony is a typical large technological system (LTS) in which standards enable diverse elements to act jointly. Network carriers provide the infrastructural backbone, telephone companies offer communication services, equipment manufacturers deliver network and terminal technology, other firms create data content, and so on. As a pan-nationally planned undertaking, the so-called 2nd generation standard GSM was initiated by politicians and industry to further integrate Europe. European bodies acted as "system builders" in conjunction with new constellations of political, industrial, and scientific agents. Besides, firms participate in various committees to compete for the later market.[1] Contrary to many LTSs of the past that started in rather unorganized socio-technical settings and developed standards only during diffusion and mostly in competition with technical alternatives, GSM was planned as a standard from the scratch, before any product was launched on the market. The role of users thus seems to have been limited to the mere "application" of an already standardized system, shaped by industrial, scientific and governmental actors.

Yet, both consumption history and a recent strand of user-oriented STS-literature have demonstrated that the influence of users on the development of technology clearly goes beyond a mere passive role as consumers. In the course of the last decade or so, research coined the expressions *mutual shaping* of technology and society or *co-construction* of users and technology in order to emphasise that users always take part in the shaping of technology[2] – if only through their creative and often unforeseen consumption habits. Marketing literature also regularly praises co-production by users, and many offers of the last decades even rely on users' investing their

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[1] Cf. Funk, Jeffrey L.: Global Competition Between and Within Standards. The Case of Mobile Phones. Houndsmill, New York 2002.
[2] Cf. Oudshoorn, Nelly; Pinch, Trevor (Hg.): *How Users Matter. The Co-Construction of Users and Technologies*. Cambridge M.A., London 2004.

time, work and expertise.[3] Furthermore, no standardization happens without users adopting the technology, and users often provide feedback to the producers.[4]

The question thus arises, what role users had in the shaping of GSM telephony. I will tackle this question in my presentation, focusing on the German context. While the complex GSM specification process often has been told, up to now, it has hardly been questioned which role users played in it as well as in the further development of GSM. Accordingly, my focus shifts from the commonly scrutinized "system builders" to the "system users". I will merge insights from LTS and standardization studies as well as from the user-focused STS field. Concepts of the "co-construction" of users and technology call for a closer look on the role of users in the shaping of large technological systems. To develop a user heuristic and to thus be able to more critically evaluate the impact of real users in the shaping of GSM telephony, in the following, users and user relevant issues are analyzed in different realms. The prospective users constructed by the "system builders" in their layout of the infrastructure are differentiated from the users marketing hoped for, and from the "real" users acting on the micro-scale.

I will proceed in three steps: As a vantage point, I will briefly talk about the national mobile telephone system before GSM. Then, I will clarify what kind of user image the actors involved in the original planning and standardization process of the 80s had in mind. I will then continue to analyze how users finally revolutionized the practice and meaning of mobile phoning, thereby effectively influencing the further standardization and shaping of GSM. The SMS here will be a main example. As a conclusion, I will try to comment more generally on the critical gap between inventing and involving users in highly complex standards.

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[3] Cf. Voß, Günter G.; Rieder, Kerstin: *Der arbeitende Kunde. Wenn Konsumenten zu unbezahlten Mitarbeitern werden*. Frankfurt a.M. 2005.
[4] Cf. e.g. the books by von Hippel; on ICT: Urs von Burg: Triumph of the Ethernet. Technological Communities and the Battle for the LAN Standard. Stanford 2001.

1. Vantage Point: Cellular Telephony before GSM

Radio frequency use has been internationally coordinated by the WARC (World Administrative Radio Conference) / ITU. Nevertheless, in Europe, eight different cellular standards were installed.[5] Cellular technology[6] solved the capacity restrictions of earlier, non-cellular mobile radiowhere low and thus far-reaching frequencies were used to cover a maximum area. Due to the restrictions, mobile telephony had been a privilege for a few politicians, managers, doctors and representatives, and to own a mobile was highly prestigious.[7]

Cellular technology de-linked the capacity from the number of available frequencies that cover the whole area. While the Bell Labs came up with the basic idea to divide the coverage areas into cells in the 40s, R & D on cellular was lengthy.[8] Only in the years around 1980, so-called first generation (1 G) cellular networks with analogue speech transmission went into service.

In West Germany, this 1 G network was a proprietary standard for which the *Bundespost* -- the governmental PTT (postal, telegraph, and telephone) -- together with its main supplier, *Siemens*, was responsible. It opened in 1986 and should serve roughly 200,000 car phones. Up to the end of the 80s, it was inappropriate for a dense inner-city network where tiny cells would be used by a mass of pedestrians.

While the *Bundespost* was led by the idea of an elitist "mobile office" on wheels, some cellular networks – e.g. urban ones in the U.S. and in Great Britain – already opened up for a larger customer segment and began to use handhelds. In Great Britain and the U.S., around 2% of the population participated in cellular telephony. The German *C-Net* was well behind these developments. Only in 1988, the so-called "transportable" – a phone design that could be carried by a shoulder strap –was legalized. Two years later, German metropolitan areas were finally provided with a denser infrastructure for handheld use while prices stayed tremendously high.

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[5] Cf. Hommen, Leif; Manninen, Esa: The Global System for Mobile Telecommunications (GSM): Second Generation. In: Edquist, pp. 71-128; Garrard, pp. 125-170; Bender, Gerd: Technologische Innovation als Form der europäischen Integration. Zur Entwicklung des europäischen Mobilfunkstandards GSM. In: Zeitschrift für Soziologie, 1999, 2, pp. 77-92.

[6] Cf. Garrard, Garry A.: Cellular Communications: Worldwide Market Development. Boston, London 1998, pp. 23-62.

[7] For example, in the early 80s, Germany's *B-Net* was available only for around 20,000 of the 20 million cars on German roads. Transmitting on 150 MHz, 74 channels were available.

[8] Cf. Brown, Barry; Green, Nicola; Harper, Richard (Eds): Wireless World. Social and Interactional Aspects of the Mobile Age. London 2002, p. 8f.

2. Plans for the Pan-European 2G Future: The GSM Standard and its Prospective User

GSM was explicitly planned as a means to integrate Europe both politically and economically. Moreover, it was hoped that GSM would give a push to Europe's economy and innovativeness as the inflexibility and backwardness of most national PTTs had become more than apparent. GSM also served to deliberate Europe's telecommunication markets.

During the 80s, the standard was specified in several European bodies (mainly in the *Conférence Européenne des Administrations des Postes et des Télécommunications* (CEPT) and the later-founded *European Telecommunications Standards Institutes* (ETSI)) with the co-operation of further political, industrial, and scientific agents. In 1982, the CEPT recommended the 900 MHz bandwidth for GSM and assembled the so-called „Groupe Spéciale Mobile" - whose initials originally formed the abbreviation "GSM". In 1987, the basic technological parameters were agreed upon and the PTTs of twelve countries as well as the two British cellular providers signed the constitutive „Memorandum of Understanding".

As an "open" standard, GSM did not determine any technical solution, but defined those functions that the subsequent products and services would realize. Producers later would decide and compete how to realize the necessary system components and terminals. In this way, the future technological development was structured – the standard served as a kind of „institutional pull"[9]. Future products would be compatible, yet also compete on the market. Moreover, GSM was upgradeable to include unforeseeable services. This new "regime" of an open standard afforded a long, steady and challenging coordination in which the "technological content" and the "social context" were co-developed.[10] Ideas had to be transformed into facts to build products and services upon. Digital transmission e.g. was chosen because it promised a higher call quality while any experience was yet missing.

Even though "real" users were missing in this process, GSM planners evidently needed – and had – distinct, though hardly verbalized conceptions about future users, based on general assumptions, past expertise and commissioned research. GSM should serve a mobile professional elite as a comfortable business communication tool. The prospective user of GSM was the travelling professional, not the European consumer. GSM planners did not break with the

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[9] Cf. Edquist, p. 22.
[10] Cf. Bender; on the „new regime of ‚open' standard setting"Edquist / Manninen, p. 156.

dominant idea of mobile phoning as a professional-elitist technology, while enlarging its scope to a European level. GSM was to give professionals a comfortable and secure mobile tool – again a kind of "mobile office"[11] - that could be used European-wide and that would leave space for future services, since new ways of communication such as ISDN or teletext were on their way or recently booming like the fax. Beside basic vocal telephony, GSM included so-called *tele services* – among them e.g. the European-wide emergency call under 112 and ISDN-like performances such as a mailbox and the display of the caller ID – and the *data services* which were to enable a wireless data transmission.[12] Besides, since 1987, the *Short Message Service* (SMS) was planned as a new and pager-like feature.

As terminals, GSM networks were to support car phones, transportables and – due to the demand of the Scandinavian countries and Great Britain – also handhelds.[13] Handhelds, however, did not play a key role in the plans, and, considering the complexity of GSM, it was unclear when and in which size handhelds would be available.

A market study for the EC from 1988 foretold 14 million European GSM users for the end of the century.[14] The number is low, not only because even marketing did not expect that cellular phoning would turn into an everyday practices. Also, towards the end of the 80s, alternatives to GSM were on the market or were just being conceptualized, that promised to be more appropriate for the mass consumer (e.g. *Telepoint* or the British PCN, which only later became part of GSM).

In 1992 - one year later than originally planned, and with meanwhile 18 countries participating – GSM networks began their service. In Germany, the idea of a car-situated, elitist telephony was continued by the first GSM networks established by the *Telekom* (the offspring of the *Bundespost*; "D1"), and its private enterprise competitor *Mannesmann* ("D2"). This shows that a system can gain *momentum* not only due to material or institutional inflexibility but also due to a cultural inflexibility that prevents constructing new user images.

To give some examples: About a dozen so-called service operators offered so-called "added-value services" that functioned like a secretary always at hand: Personal operators were at your service all the time and helped out with hotel and restaurant reservations, driver-guide

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[11] Cf. *Funkschau*, 1988, H. 24, pp. 46f („Mobilkommunikation. Das D-Netz nimmt Konturen an").
[12] However, GSM planners eventually settled for a transmission code suitable only for speech – data services would now need separate network channels and terminal add-ons.
[13] Cf. Temple, Stephen: The GSM Memorandum of Understanding – the Engine that Pushed GSM to the Market. In: Hillebrand, pp. 36-51, here p. 40.
[14] Cf. Garrard, p. 133.

service, theatre tickets, flower orders, etc.[15]Advertising overemphasized the elitist prestige and envisioned travelling businessmen and architects as users (PICTURE), while rarely displaying less prestigious workers such as service personal.

Indeed, most subscribers were male and in top positions, and often, the employers financed the phone and phone service. Most phone calls lasted only one minute and were placed in vehicles. Correspondingly, car phones and transportables dominated the terminal offers (PICTURE). As the car still was the dominant place for phone calls, some German producers even planned – having a good quality radio as lead technology in mind – two product lines: the portable handheld and the fixed car phone.[16] In contrast, Sony's British telecommunications division declared, in 1993, that future development should follow the line of the Walkman, and Nokia, with its by now legendary *2110* line, conceptualized the cell phone – in the words of the lead designer Frank Nuovo – as „(…) friendly, like a companion, not a little, square, hard box".[17]

3. GSM in the hand of the mass consumer: How users revolutionized the practice and meaning of mobile phoning

GSM terminals diffused more rapidly than any other mass consumption technology before (PICTURE).[18] By 2000, mobile connections exceeded the number of landlines.[19] In1994, *E-Plus* opened as a third network and targeted the average mobile worker. Now, mass marketing methods that bundled the terminal, the telephone contract and user specific tariff conditions into an affordable package were applied. Since 1997, prepaid systems were available that constituted the majority of cell phone users around 2000.

Claude Fischer has demonstrated how users shaped the American landline phone.[20] Likewise, users "invented" mobile phoning as an instrument for social networking and fun rather than simply following the lines once invented for them. Only a few years after GSM's launch, the

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[15] Cf. e.g. *Handelsblatt*, 7.7.1993, p. 20; *Funkschau*, 1993, H. 7, pp. 80-88 („Service Provider. Wer bietet mehr?"); Schoblick, Robert: Autotelefonieren leicht gemacht. Geräteauswahl, Inbetriebnahme und Bedienung. München 1993, pp. 159-162.

[16] Cf. *Funkschau*, 1993, H. 1, p. 12 („Zweigeteilte GSM-Geräte-Entwicklung").

[17] Cf: Steinbock, Dan: The NOKIA Revolution. The Story of an Extraordinary Company That Transformed an Industry. New York 2001, p. 272.

[18] In the U.S., television diffused faster than cellular. Cf. Levinson, Paul: Cellphone. The Story of the World's Most Mobile Medium and How It Has Transformed Everything! New York u.a. 2004.

[19] Cf. *Test*, 2000, H. 12, pp. 24-27 („Harte Kerle"), p. 24.

[20] Fischer, Claude: America calling: a social history of the telephone to 1940. Berkeley 1992.

„mobile office" of the businessman turned into an everyday communication tool of the European consumer, who created new meanings for the implemented services. Many consumers at first bought a mobile for emergency calls, yet began to use it more and more in everyday situations. Thus, even they themselves were not fully aware of their uses! In a European study from 1996, not even 10% of the interviewed Germans estimated that a cell phone was of use, and less than 2% wanted to purchase one.[21] Handhelds were seen as a "yuppie-equipment for young workaholics and show-offs who, even in a café, could not help the conduction of business talks".[22] However, by their largely unpredictable and uncontrollable practices, users shaped mobile telephony into an everyday technology to master their daily micro-mobility and to network their social life. Parallel to such novel adoptions, mobile industry realized the market potential of what they at first had called a "phone for pedestrians".

This co-shaping of consumers and their cell phones shall be demonstrated in more detail for the SMS, which, in recent literature, is often mistakenly described as a forgotten by-product of the GSM specifications.[23] In the standardization process, the SMS was planned as an enhanced, bi-directional pager. Further, rather elusive perceptions of its potential existed: The necessary SMS centres also could provide regional news such as traffic or weather information ("cell broadcasting"). Others thought of the SMS as a kind of teletext where individual users could ask for certain information, e.g. stock news. The SMS was conceptualized as a strange hybrid of an interpersonal pager, a new kind of teletext-like information-on-demand-device and a text-based radio receiver. Rather than having no idea for the usability of the SMS then, different GSM experts had too many of them and these were not backed by any market analysis.[24] Thus, there was no agreement on a clear-cut user vision that could have been easily implemented by network builders and service operators.

German short message services began in 1994. In the *D1* net, in order to send a message, you had to call an operator that would accept the oral message and then type and send it. Obviously, typing on the cellular keypad was considered as too clumsy for the prospective users. In other networks, you could use the computer, the cell phone or the teletext interface to send an SMS.

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[21] Cf. Fortunati, Leopoldina: Italy: stereotypes, true and false. In: Katz et al., 2002, pp. 42-62.
[22] Cf. *Funkschau*, 1995, H. 18, pp. 39-40 („Ungebremster Mobilfunkboom"), p. 40.
[23] Cf. e.g. Agar who describes the SMS as „buried in the GSM specifications as little more than an afterthought", p. 62. Cf. Agar, Jon: Constant touch. A global History of the Mobile Phone. Duxford, Cambridge 2003.
[24] Cf. also Trosby, Finn: SMS, the strange duckling of GSM. In: Telektronikk, No. 3, 2004, pp. 187-194.

With lower prices, some companies used the function to communicate with their outdoor staff. It was only by 1998, that teenagers as well as young adults began to explore text messaging as a cheap means of everyday coordination, thereby not only creating new forms of intimate communication, but also a new way of human-interface-interaction which is nowadays referred to with the buzzword of a "thumb culture" (PICTURE).

However, the cult soon turned into commerce, and phone producers as well as service providers were fast to react to the growing SMS boom. The T9 software facilitated the key input and new SMS services were implemented. Besides, the increasing amount of sent messages fired industry's inspiration about the future of mobile data and it brought about unforeseen income.

Thus, it is possible to argue that users shaped part of the GSM cell phone. At the same time, however, the "system builders" created a vast array of new SMS services. By 2000, the so-called enhanced SMS was specified.[25] Via "micro payments" debited to one's cell phone bill, one now could order anything from ring sounds to horoscopes or pornographic screen savers per SMS.

4. Final comments

While it is obvious that users were crucial agents in the shaping of cellular technology, at the same time, the GSM standard and infrastructure is yet a "black box" and "real" users did play no role in the official standardization process of the 80s. Users shaped certain user features and meanings, yet they were hardly aware of the infrastructural complexity and had little influence on the elements that were "blackened" by the system builders. The unspecific wording of the "mutual shaping" of users and technology might prove unhelpful when trying to specify users' agency more critically. Rather, one should clearly distinguish between *users in their everyday contexts* - e.g. those users that turned WAP services into flops - and those *user visions* constructed by GSM planners, suppliers, or marketing.

The question thus arises – and even becomes more pressing after the recent experience with UMTS - to what extent users can or should be included in trans-national standardization processes. While prospective users influenced GSM planning and implementation, the way GSM was later used by the mass consumer was unforeseen by all agents. The standard's flexibility

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[25] Cf. Holley, Kevin: The Development from Mid-1988 to 2000 (Kap. 6: Short Message and Data Services). In: Hillebrand, pp. 417-424.

however enabled a creative re-interpretation (e.g. of the SMS function) as well as steady enhancements that responded not only to actual user practices, but also to mere marketing hopes (e.g. WAP). Due to the previous underestimation of GSM's potentials, by the mid-90s, marketing – that promised to speak in the name of "the user" - became a favoured tool to conceptualize GSM offers, but also to steer the plans for the 3rd generation standard, UMTS. For the case of UMTS, marketing and forecast studies however gained a rather dubious influence on the decision-making. Mika Pantzar has shown that the prospective users here were melted down to mere numbers that promised a huge turnover and that were based on the hopes of business experts and consultants rather than on actual user surveys.

Even a participatory process of standardization including users will not be able to tell the future. Yet, it might guarantee that users are not conceptualized too stereotyped. Users are innovative actors due to their creative and unforeseeable practices and meanings that they develop along product offers. Thus, standardization theory should definitely have an interest in the micro-politics of everyday life and consider the many socio-cultural aspects of users' everyday routines.