Werner Wirth, Thilo von Pape & Veronika Karnowski

New technologies and how they are rooted in society

We argue that the explanatory potential of the reinvention-concept for ICT has not been seized yet. To push forward investigations on this phenomenon, we propose a new approach based on the concept of appropriation as a two-dimensional process mediated and driven by metacommunication among users. Whereas most existing appropriation studies remain on a qualitative, exploratory level, our approach aims at a quantitative, standardized instrument for measuring appropriation processes.

Focussing on the idea of appropriation through metacommunication, we will demonstrate how a combination of both qualitative and quantitative methods leads to new evidence that helps understanding appropriation processes and thus expands research on the reinvention of ICT at the same time.

1 Advancing reinvention research with the appropriation concept

1.1 Reinvention – diffusion theory's promising innovation

Looking back on the more than 40-year history of his groundbreaking work "Diffusion of Innovations", Rogers (2004) highlights three major additions made since the first edition: the concept of critical mass, a focus on diffusion networks, and the discovery of reinvention.

All of these improvements are very apt to describe the evolution of innovations in the information and communication domain. As for diffusion networks and the effect of critical mass, their special importance for this field is widely accepted (Rogers 2003), and both serve in numerous studies to explain the diffusion of cellular phones, online services and other end devices and services (e.g. Schenk et al. 1996, Ling 2001). But what about the third new idea in diffusion theory: reinvention, defined as "the process through which an innovation is changed by its adopters during the diffusion process" (Rogers 2004, p. 19)?

Based on this definition, one would expect a high significance in the diffusion of ICT innovations, since communication technologies have always experienced change by their users (for a historical overview see Flichy 2004). Furthermore, they unite a number of attributes Rogers (2003) considers as fostering reinvention: high complexity and a large variety of technical functionalities on the innovations' side, on the adopters' side a strong desire for symbolic self-presentation – particularly among teenagers (Höflich & Gebhardt 2002, Taylor & Harper 2002,

Ling 2001). Finally, Rogers (2003) considers the likelihood of reinvention especially elevated among late-diffused innovations such as the mobile telephone, which has reached saturation in most western societies today (e.g. Regulierungsbehörde für Telekommunikation und Post 2005).

However, the existing work on reinvention concentrates on the field of political and organizational studies, whereas ICT adoption plays only a minor role. (Charters & Pellegrin 1972, Goodman & Steckler 1989, Glick & Hays 1991). Contrary, most recent studies on the diffusion of ICTs are building explicitly on the binary adoption concept, combining it with the theory of planned behavior (Taylor & Todd 1995, Hung, Ku & Chan 2003) or the technology acceptance model (Taylor & Todd 1995, Pedersen et al. 2003, Vishwanath & Goldhaber 2003).

1.2 Concepts of appropriation outside diffusion theory

At the same time, the phenomenon of users changing innovations in the course of implementation has been studied by a number of approaches outside diffusion theory, namely cultural studies (e.g. Silverstone & Haddon 1996), social constructivism (e.g. Ito & Okabe 2005), information systems research (e.g. Carroll, Howard, Peck & Murphy 2003) and frame analysis (e.g. Höflich 2003). Though the theoretical backgrounds of these approaches are very different, one concept is present in all of them: the concept of appropriation as, generally speaking, taking possession of an innovation by integrating it into one's personal context of everyday-life. Based mainly on qualitative data on small user groups, these studies show that users with different background (e.g. sex, age,…) reinvent ICT in different ways, so that a medium can take different forms and meanings through appropriation.

The appropriation-concept may help to advance reinvention theory (and thus diffusion theory) if the gap is closed between the mainly qualitative micro-level alignment of appropriation research and the classically quantitative diffusion research mostly dealing with aggregate data.

2 A new approach to appropriation research

Our approach is marked from its inception by a very careful orientation towards empirical evidence. Based on grounded-theory-methodology, a first simple outline model of appropriation processes has been developed. This one was exposed first to a series of three quantitative studies using standardized online-questionnaires and then to three qualitative studies based on semi-structured interviews.

2.1 An outline model of appropriation based on grounded theory

The present approach is based on an exploratory study on the usage of mobile telephones by young Germans conducted in 2001. Following grounded-theory-methodology (Glaser & Strauss 1967), the analysis of 16 semi-structured interviews led to a first formal model of appropriation. In a second step, adequate theoretical elements were integrated, namely from cultural studies (e.g. Silverstone & Haddon 1996, De Certeau 2002), activity theory (e.g. Leontjew 1964) and reception analysis (e.g. Charlton & Neumann-Braun 1992).

As a result, we understand appropriation of an innovation as taking possession by integrating it into one's personal everyday life beyond the simple adoption-decision. We further distinguish a practical and symbolical dimension of appropriation: appropriation is realised in practice by using and handling the device in everyday life and symbolically by deploying it to represent one's identity in the social context. This process is negotiated through metacommunication among users (see fig. 1)[1].
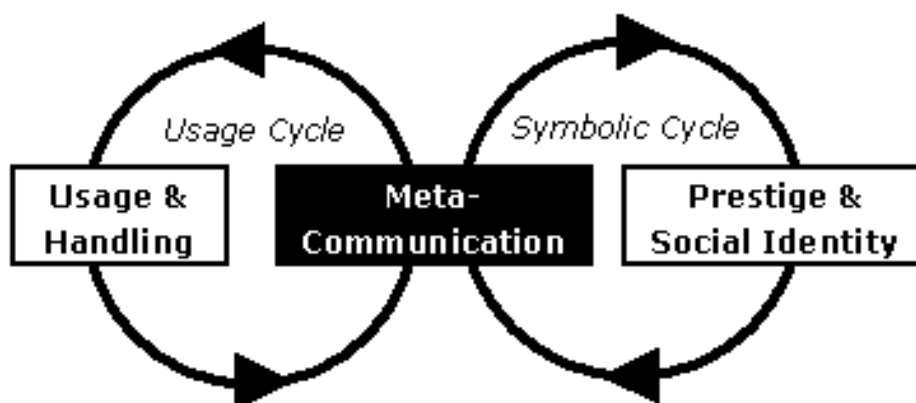

Fig. 1: The circular appropriation model

During the process of appropriation, usage and handling as well as prestige and social identity are constantly developing and changing. In time, habitual usage forms emerge and stabilize as well as social evaluations of the symbolic value of certain usage forms, namely their appropriateness or style. In this process, metacommunication serves as a catalyst (Hepp 1998). On the one hand, it powers the ongoing appropriation process, and on the other hand, it diminishes during this process until usage and handling as well as prestige and social identity are stable and undisputed among the respective user groups.

Focussing on metacommunication, we will now demonstrate how quantitative and qualitative studies were combined in an iterative process in order to expand and improve understanding of appropriation.

2.2 Quantitative evidence on the process of appropriation

A first series of quantitative studies was conducted in 2003 and 2004 in form of online-surveys among young German mobile telephone users[2]. In this paper, we will not discuss the general results of these studies, but illustrate our methodology by discussing one exemplary point where further differentiation seemed especially necessary: The appropriation model attributes a central role to metacommunication. As a catalyst of the appropriation process, it is expected to decline gradually as appropriation nears completion.

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[1]   Metacommunication is also influenced by certain external factors such as mass media, the innovations' suppliers, but also legal regulations.

[2]   www.giga.de: 360 adolescents aged 12-24, www.handy.de: 294 adolescents aged 12-24, www.misteradgood.de: 905 adolescents aged 14-19. We thank Silke Mattle and Marcus Foebus for the accomplishment of these studies.

This hypothesis has been tested in a secondary analysis of the three datasets, through a cross-sectional comparison of the degree of metacommunication reported by users at different stages in the appropriation process. In contrast to our expectations, metacommunication was not lower among those users new to mobile telephony (purchase of first mobile telephone within last two years) than among "veteran" users with a relatively long usage history.

An entirely different picture emerges when considering the purchase of the end device presently used as starting point of the appropriation process. Thus, one would not investigate appropriation of the basic innovation "mobile telephony" but of the concrete mobile telephone presently used. Here, a clear decline in the degree of metacommunication becomes apparent over usage history.

How can this difference be explained? A look into qualitative data helps to clarify.

2.3   Qualitative evidence on appropriation of basic and embedded innovations

To further improve the model and the instruments, three qualitative studies based on semi-structured interviews were conducted. In order to observe different appropriation patterns among different user groups, the interviews were realised with senior citizens, teenagers, and students. General results are or will be published in a different context (cf. von Pape, Karnowski, Wirth 2004) – here we concentrate on the question raised above concerning the degree of metacommunication at different points in the appropriation process.

If the basic innovation of communicating with other people through mobile end devices is by now widely common and accepted, why don't people stop talking about it?

Interview statements suggest that the ongoing metacommunication is stimulated by the innovative functionalities that are integrated into every new generation of end devices (e.g. SMS, WAP, mobile games, video telephony,…). When a user buys a new end device, he relaunches the debate on what one can do with one's mobile telephone:

> *„There's a lot of talking [...] every time someone has got a new cell phone, about what it can perform or, I don't know, if the ringing tones are polyphonic - playing and simply showing what it can perform."*

This display of functionalities is - most explicitly among young users – combined with judgements on the prestige value of the end device.

> *"Yes, like, when I got my new phone, they did ask, 'Wow, which functions does it have?' […] and, 'Wow, that looks good', 'Wow, that looks shit'"*

New functionalities may even lead to a new reflection and renegotiation of already established and well-appropriated aspects of mobile telephone use. Thus, with the new alternative of short messaging services, the convenience of telephoning has been questioned.

> *"If you call, you have the obligation that you cannot just say hi, what's up, and bye bye, it has got to be somewhat more profound […] if I just want to know, 'what are you doing' and, like, 'I am here' – then I would rather use SMS."*

3   Conclusion

The new approach presented here is intended to better explain phenomena of reinvention and thus advance diffusion theory beyond the binary adoption question towards an appropriation-model able to predict multiple patterns of appropriation.

Grounded on a qualitative study of young telephone users, our outline model defines appropriation as a process of taking possession of an innovation on both practical and symbolic levels, powered and mediated through metacommunication among users. First qualitative and quantitative studies based on this model are leading to further differentiation. The methodological proceedings and their outcomes are demonstrated with the exemplary – and at the same time central – question of how metacommunication develops in the appropriation process. Quantitative findings led to questioning the hypothesis stated in the original appropriation model, and the interpretation of semi-structured interviews helped explain these findings.

Differentiating into the basic innovation of mobile communication and multiple embedded innovations (following Mensch's 1975 distinction) that are being integrated into later product generations, one can understand why metacommunication does not decline even among those users who have had mobile telephones for a long time already: the appropriation of new functionalities and services embedded into each generation of end devices keeps stimulating the ongoing process of appropriation of the basic innovation mobile telephony. Thus we find short term decreases after the acquisition of a new end device and in the longer term a continually high level of meta-communication (s. fig. 2).
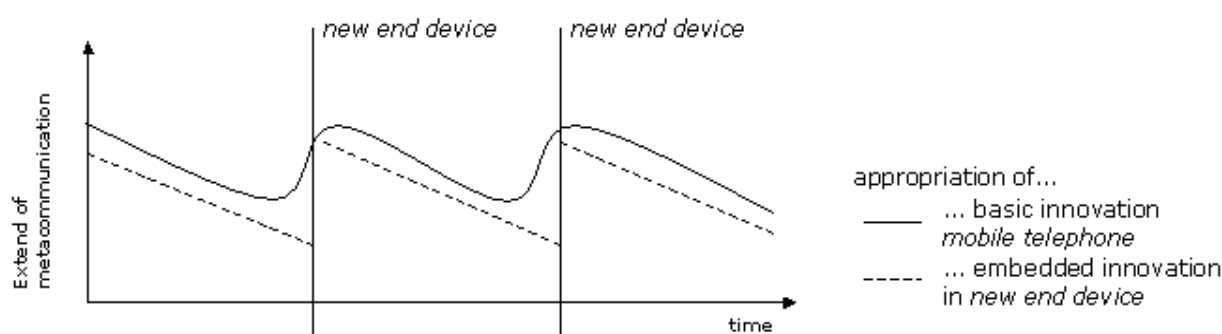

Fig. 2: Embedded innovations stimulating metacommunication in the appropriation process

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